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INTRAHEPATIC CHOLANGIOJEJUNOSTOMY WITH PARTIAL HEPATECTOMY FOR BILIARY OBSTRUCTION*

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THIS report presents another case of biliary obstruction treated by intrahepatic cholangiojejunostomy and partial hepatectomy, using a method described by Longmire and Sanford.[1] The procedure was successfully employed in a case of recurrent obstruction of the common duct after four attempts at repair had failed.

CASE REPORT

In 1941 the patient began to have attacks of upper right quadrant pain associated with nausea and vomiting which were interpreted by his physician as being due to cholecystitis. The patient refused operation during the next two years. On Feb. 16, 1943, a cholecystectomy was done and the convalescence was uneventful except that a few days after discharge from the hospital the patient noticed an icteric tinge of his skin and that his stools were light in color. The jaundice increased and the patient began having frequent attacks of chills and fever. On May 11, 1944, an exploratory laparotomy revealed that the common duct was absent in the region of the cystic duct. The duodenum was elevated and the common duct traced down to the ampulla but only a fibrous cord could be identified. A catheter was placed in the proximal remnant of the common duct and brought out through a stab wound and the abdomen closed. The drainage of bile to the outside continued for about one year, during which time the jaundice decreased and the general condition of the patient improved. On April 11, 1945, a choledochoduodenostomy was done, using a vitallium tube. For the first three months following this procedure the patient did well, had no jaundice and was gaining weight. How-

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ever, at the end of this time he again began to have attacks of chills, fever and jaundice. The attacks increased in severity and frequency until they were almost continuous by September, 1946. On Sept. 23, 1946, a choledochoduodenostomy was done over a T tube. Following this procedure the jaundice again disappeared and the patient gained in weight. However, within four

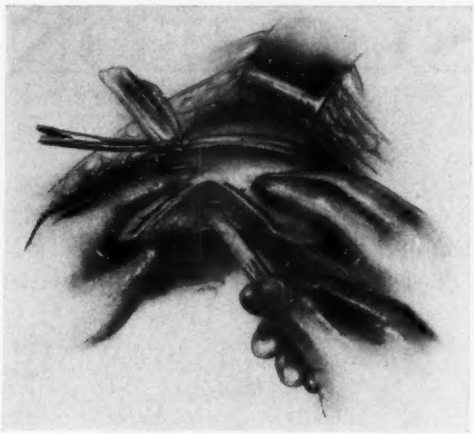

Fig. I. Mattress sutures in the liver.

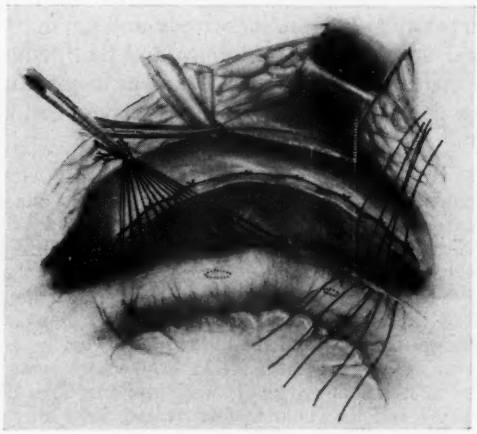

Fig. II. Anastomosis of the jejunum to the liver.

months he again began to have recurrent episodes of chills, fever and jaundice and in addition recurrent abscesses of the abdominal wall. On Feb. 17, 1948, x-ray examination of the abdomen showed that the limbs of the T tube were both within the duodenum. The T tube was removed and during the next two months the patient was free of all symptoms and the jaundice cleared. However, at the end of that time chills, fever and jaundice again occurred.

On Nov. 3, 1948, the area of the common duct was again explored and no duct could be identified. The liver was incised for a depth of about 1½ inches and a bile duct found that was not positively identified as either the right hepatic or common duct. A catheter was placed in this duct and was brought

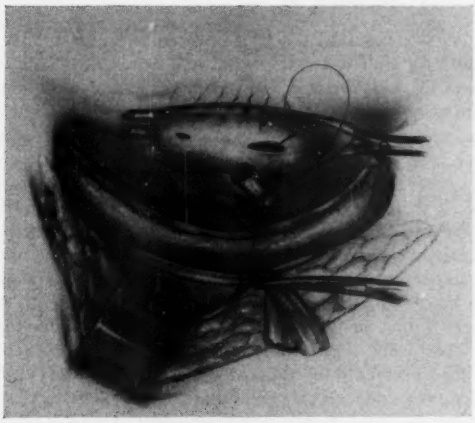

Fig. III. Anastomosis between jejunum and bile ducts.

Fig. IV. Enteroenterostomy.

to the outside. The catheter drained satisfactorily until October, 1949, at which time chills, fever and jaundice recurred. X-ray examination of the abdomen at this time showed the catheter to be in the duodenum. On admission to the hospital the patient had marked jaundice, chills and fever, was emaciated

and the abdominal wounds were healed. Results of laboratory tests at this time were as follows: Icterus index 90 units; serum chlorides 560 mg; serum albumin 3.2 grams; serum globulin 2.8 grams; Prothrombin 100 per cent activity; red blood count 4.8 million; hemoglobin 13 grams per 100 cc.; white blood count 23,700; hematocrit 35.

On Oct. 19, 1949, the abdomen was entered through a V-shaped subcostal incision with the long end of the V on the left side. The adhesions were freed from the left lobe of the liver and for a short distance on the right lobe. The triangular ligament of the left lobe of the liver was cut and a soft rubber tissue drain was passed around the base of this lobe of the liver for elevation. The left lobe of the liver was compressed between the thumb and index finger by an assistant and starting at the anterior edge of the left lobe a series of mattress sutures was placed through the entire thickness of the liver. After each suture was placed the liver was cut along the distal edge until a large bile duct about 1 cm. in diameter was encountered (fig. 1). The duct was cut as far distally as possible, leaving a 1 cm. stump protruding for the anastomosis. The remainder of this lobe of the liver was removed by the method described and another small duct about ¼ cm. in diameter was encountered. The vessels of the cut surface of the liver were ligated and a loop of the jejunum brought up and sutured to the posterior edge of the liver (fig. 2). An anastomosis was made between the jejunum and the bile ducts over French catheters (fig. 3). The jejunum was then sutured to the anterior edge of the liver and an entero-enterostomy done between the loops of the jejunum (fig. 4). A drain was placed down to the anastomosis and the wound closed in layers. Postoperatively bile was noted in the stool for the first time on the fourth day. The highest temperature recorded after operation was 99.8 degrees. Bile escaped from the wound about the drain for the first few days after operation but the incision healed per primum. The icterus index was 200 for the first five postoperative days but returned to 33 by the twentieth postoperative day. Since the operation the patient has continued to gain weight and strength and his general condition is much better. The jaundice has disappeared and the last icterus index, at eight months after operation, was 21. Serum bilirubin at this time was 1.9.

Discussion

This procedure, when indicated, has certain advantages over re-entering the previous operative field about the hilus of the liver where dense vascular adhesions and obliteration of landmarks makes dissection tedious and hazardous. The procedure itself is technically much easier than anastomosis of the common duct in the presence of much scarring and adhesions from previous operations. The left lobe of the liver, after severing the triangular ligament, can be elevated so that accessibility for accurate anastomosis can be done without great difficulty. The walls of the biliary ducts were thickened so that they were well adapted to a suture anastomosis, and the ducts were dilated enough that there is a good chance that they will stay open. Experimental work by Longmire and Sanford suggests that although the main right and left hepatic ducts do not communicate, there is communication between the two systems

through numerous fine ducts in the area of the caudate lobe of the liver, as injection of the right and left duct systems with different colored plastic solutions and digestion of the substance of the interhepatic duct systems of the liver has shown that both colors of the plastic materials are found in some of the small ducts of the caudate lobe. Stewart, Cantarow and Morgan[2] found no evidence of intrahepatic communications between the obstructed and nonobstructed portions of the cat's liver. Harley and Barratt[3] found no gross difference between the obstructed and nonobstructed portions of the cat's liver after five or six months. Rous and Larimore[4] observed a rapid atrophy of the obstructed portions of the rabbit's liver with considerable hypertrophy of the unobstructed segment, the former being reduced to a fibrous tag at the end of four months. Longmire and associates have reported three successful intrahepatic cholangiojejunostomies in adults and unsuccessful attempts in three infants who, by previous operations, were found to have complete agenesis of the extrahepatic biliary system. Lahey, Cattell[5,6] and others have suggested restoration of the function of the Sphincter of Oddi whenever possible in repair of biliary tract lesions. However, in this case reported, it has been previously found that the common duct was completely replaced by fibrous tissue from the cystic duct to the ampulla.

Summary

A successful case of intrahepatic cholangiojejunostomy with partial hepatectomy for biliary obstruction is reported.

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BENIGN LESIONS OF THE CERVIX

A Study of Two Hundred and Twenty-Six Cervical Stumps*

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OFTEN pelvic organs are removed for the alleviation of pelvic pain and the cervix is left in situ, when the cervix, and not the extirpated structures, was responsible for the symptomatology. Needless to say these patients experience only partial relief and in some cases no relief. Many times diseased intrapelvic organs are removed for the correction of pelvic pathology producing pain, the cervix left in situ, and the patient experiences considerable or total relief for many years, only to have a pathological process develop in the retained cervix producing symptomatology as disagreeable or uncomfortable as that existing prior to pelvic surgery. The development of carcinoma in the cervical stump has received much attention and many articles have been written concerning the probability of, and percentages of, retained cervices undergoing malignant change. Very little attention, however, has been focused upon the multitude of symptoms and the severity that these symptoms may attain, as a result of benign lesions developing in a cervical stump, or from a retained cervix that was chronically diseased at the time of hysterectomy.

An excellent opportunity for the study of pathologic changes occurring in the cervix and the symptomatology produced thereby is afforded in cases that have had supravaginal hysterectomy or supravaginal hysterectomy and salpingo-oophorectomy, either unilateral or bilateral, with or without appendectomy. The ideal being cases in whom bilateral salpingo-oophorectomy, supravaginal hysterectomy and appendectomy has been executed. However, patients having had at least a supravaginal hysterectomy provide suitable subjects for critical evaluation as to the importance of the diseased cervix in the production of pelvic symptomatology.

With this in mind we undertook a critical analysis of patients admitted to the Ochsner Clinic and the Tulane Unit, Charity Hospital of Louisiana at New Orleans from January, 1931, to July,

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1947, having cervical stumps sufficiently diseased and productive of sufficient symptomatology to warrant surgical excision. In that survey there were 123 patients so treated during the 16½ year period. These cases did not include the innumerable patients with symptomatic cervical stumps in whom symptoms were relieved by simple cauterization. It is to be emphasized that 40, or almost one third of the patients in that series (32.5 per cent) still had the same complaint for which the original pelvic operation has been performed; 23 having only one operation—supravaginal hysterectomy usually combined with appendectomy—the other 17 having been subjected to supravaginal hysterectomy, bilateral salpingo-oophorectomy and appendectomy, performed at various laparotomies. Removal of the cervix in these 40 patients produced relief of all symptoms. In the two and one-half year period, July, 1947, to December, 1949, 103 additional diseased, symptomatic cervical stumps have been extirpated in patients admitted to the Division of Gynecology, Tulane Unit, Charity Hospital, and the Section of Gynecology, Ochsner Clinic, New Orleans. As a result of the study of the 123 cases and the beneficial results observed in them we have performed almost as many cervical stump excisions during a two and one-half year period as were performed in a previous 16½ year period (Table I). A critical analysis of these 226 cases of cervical stump, sufficiently diseased and sufficiently symptomatic to warrant surgical excision, form the basis of this communication. This series does not include cases in which the cervical stump was not diseased or asymptomatic or in which the disease process was so mild that simple office cauterization controlled the pathology and symptomatology.

TABLE I

Cervical Stump Excisions

January 1931-July 1947	123
July 1947-December 1949	103
Total	226

Symptomatology

It is interesting to note that many cases occurred in patients past 50 years of age, proving that leucorrheal discharge in the main is dependent upon an infectional and not an endocrine basis. Though estrogens can produce an increase in cervical mucous, abnormal quantities of discharge are nearly always accompanied by chronic infection.

No age group is immune to the development of pathological lesions (and subsequent symptomatology) arising in a cervix. In

the series of 123 cervical stumps the number of patients in each decade are found in Table II.

TABLE II

Age Distribution—123 Cases

Age	Cases
20-29	6
30-39	20
40-49	55
50-59	17
60 and over	5

Multiplicity of symptoms was the rule. The type of symptoms and their percentage distribution are recorded in Table III.

TABLE III

Symptoms	Total	Per Cent
Pelvic Pain	112	49.5
Leucorrhea	105	46.4
Bloody Discharge	84	37.1
Dyspareunia	72	31.4
Backache	56	24.7
Urinary Discomfort	60	26.5
Bearing Down Pain	34	15

One hundred and five patients (46.4 per cent) complained of leucorrhea, while 84 (37.1 per cent) had a bloody discharge. The principal pathologic lesions in these cases of posthysterectomy bleeding from the retained cervix are listed in Table IV. Eleven and nine tenths per cent of the cases complaining of bloody discharge had carcinoma of the cervical stump. Chronic cervicitis with or without erosion or ulceration was responsible for 62 per cent of the

TABLE IV

Pathology in Bloody Discharge. No. of Cases, 84

Symptoms	Total	Per Cent
Cervical Erosion or Chronic Cervicitis	50	60
Carcinoma	10	11.9
Ulceration	2	2.4
Polyps	8	9.5
Endometriosis	6	7.2
Stricture	7	8.7
Fibroid	5	6
Hematotrachelos	1	1.2

total. In a few of these cases sufficient functional endometrial tissue was present to account for the bleeding. Polyps, stricture, endometriosis, fibroids and hematotrachelos accounted for the remainder.

The most common complaint was pelvic pain which occurred in 49.5 per cent of all cases. Usually chronic in nature, it was described as lower abdominal involving either one or both sides of the iliac fossae; sometimes ill defined and aggravated by walking, standing or intercourse. In some the pain was constant, in others intermittent. Backache was present in 24.7 per cent, dyspareunia in 31.4 per cent and "bearing down" sensation in 15 per cent of these patients. Although lower abdominal pain, backache, dyspareunia and "bearing down" sensation are caused by disease of intra-abdominal organs, these symptoms are frequently the result of a chronically diseased cervix. Sir James Young[1] in 1930 first described this important relation between lower abdominal pain and a chronically diseased cervix and called attention to the diagnostic significance of a clinical procedure for reproducing the patient's symptoms. This test has failed to attract much attention, and a review of current textbooks reveals no reference to reproduction of pelvic pain which is caused by a diseased cervix. The only reference to it in the American literature has been by Holloway[2] who in 1936 emphasized the importance of reproducing the patient's symptoms by applying tincture of iodine or silver nitrate to the cervix and by one of us (C. G. C.)[3,4] who in 1938 and 1949 again directed attention to reproduction of pelvic pain on motion of the cervix.

On our service the following clinical test for many years has proved of great help in determining the part the cervix or cervical stump plays in producing the patient's symptoms. In the absence of fixed pelvic masses the ability to reproduce a patient's symptoms on motion of the cervix means that the cervix is the etiological factor. If pelvic masses are present, pressure on these masses should reproduce some of the patient's symptoms, if these masses play any part in the symptom complex. The important factor is reproduction of pain and not merely production of pain. Production of pain is possible in any woman if the examination is very vigorous. Reproduction of pain means the ability on gentle palpation to bring about the same pain in the same locality, with the same distribution, as complained of by the patient in her history. This is true whether the patient complains of lower abdominal pain, backache, dyspareunia, "bearing down" sensation, alone or in any combination.

The examining fingers should first be inserted into one lateral fornix and the cervix pushed to the opposite side of the pelvis. For example (figs. 1 and 2) if the pain is on the right side, the cervix

should be pushed to the left, with resultant tension on the right cardinal ligament and vice versa. The patient should then be asked "is this the same pain of which you complained?" and not merely "does this hurt?" It is possible to displace a healthy cervix considerably

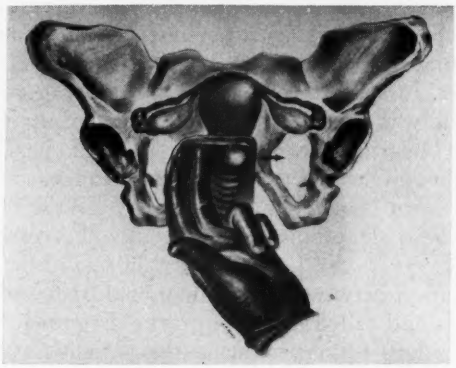

Fig. 1. Method of reproducing pain due to cervicitis. Patient complains of pain in right side, cervix is pushed to left. (Direction of arrow.)

without discomfort, and even maximum displacement, though uncomfortable, does not cause actual pain. If backache is a complaint

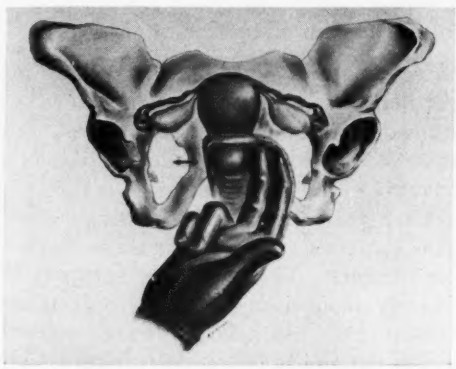

Fig. 2. Method of reproducing pain due to cervicitis. Patient complains of pain in left side, cervix is pushed to right. (Direction of arrow.)

the examining fingers are introduced into the posterior fornix and the cervix pushed toward the symphysis pubis and the uterosacral ligaments placed under tension (fig. 3). Reproduction of the patient's backache means that the cervix is the causative factor and

that appropriate methods of therapy directed toward curing the chronic cervicitis will produce relief.

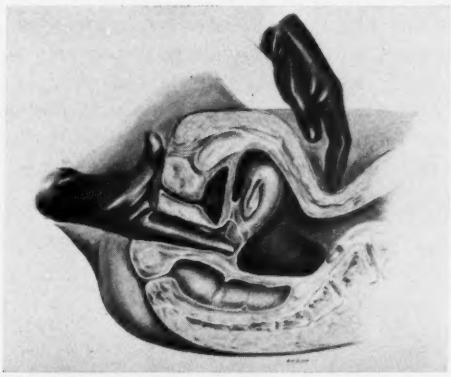

Fig. 3. Method of reproducing pain due to cervicitis. Patient complains of backache, cervix is pushed anteriorly. (Direction of arrow.)

Deepseated dyspareunia is frequently due to a chronically diseased cervix. Many women are reluctant to volunteer that intercourse is distasteful to them because it occasions pelvic pain. Every married patient should be carefully questioned as to the presence of painful coitus. We have seen women who had waited hopefully for years for some physician to ask them about their marital habits and yet never volunteered the information regarding dyspareunia; but once asked, cheerfully supply whatever information the physician desired. Often endocrine therapy for "menopausal symptoms" had previously been prescribed without result. Careful questioning revealed that all was not happy at home. Therapy directed towards the diseased cervix produced relief from dyspareunia, marked improvement in the home situation and discontinuance of the needless and misdirected endocrine therapy. Whether the cervix is the cause of dyspareunia or not can be decided by motion of the cervix and attempting to reproduce the same type of pain as the patient experienced during coitus. Removal of the diseased cervical stump was followed by complete relief in all patients that we have been able to follow.

In 34 (15 per cent) of patients "bearing down" pain in the lower portion of the abdomen was recorded. The pain was described as feeling as if "the organs were falling out" and was usually aggravated by any activity. Many of these patients had third degree prolapse of the stump while the remaining presented a first or second degree prolapse. This makes it difficult for us to accept the conclu-

sion of some who contend that the cervix aids in the support of the vaginal vault and thus should not be removed at the time of hysterectomy. To determine whether a prolapsing or prolapsed cervical stump is causing the patient's symptoms one merely grasps a lip of the cervix with a tenaculum and gently pulls caudad in the direction of the axis of the vagina (fig. 4). If this maneuver reproduces the symptoms then the prolapsed stump is the causal agent. No examination of a cervix is complete without the passage of a sound to rule out stricture or stenosis.

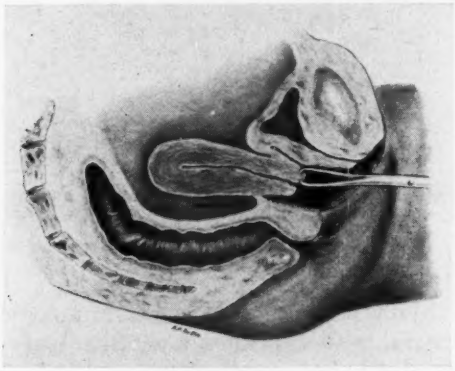

Fig. 4. Method of reproducing pain due to prolapse. (Traction in direction of arrow.

The symptoms initiated and maintained by a chronic cervicitis are due to lymphatic extension of the responsible organism or organisms. Extension down the lymphatics of the uterosacral ligament produces backache. Dissemination laterally into the lymphatics of the broad ligament produces lower abdominal pain. Winsbury White[5] has demonstrated that anterior extension into the lymphatics draining to the trigone of the bladder produces cystitis and trigonitis. Discomfort in the urinary tract, usually dysuria and frequency was a complaint in 26.5 per cent of this series. Some patients had been treated unsuccessfully for these symptoms by local applications of silver nitrate and frequent soundings, whereas upon removal of the infected cervical stump the urinary symptoms completely disappeared.

Pathology

The pathologic entities encountered in this series are listed in Table V. We do not wish to imply that such a high percentage of disease occurs in all cervical stumps but it is to be re-emphasized that these figures were obtained from cervices which were consid-

ered sufficiently diseased to warrant surgical extirpation. It is unfortunate that the total number of patients with a cervical stump who were examined over the same period of years and had no pathology or pelvic complaints, or the number of patients with a cervical stump and pelvic complaints who were relieved by single office cauterization, is not available. It is also regrettable that records of their previous surgical treatment were not obtainable.

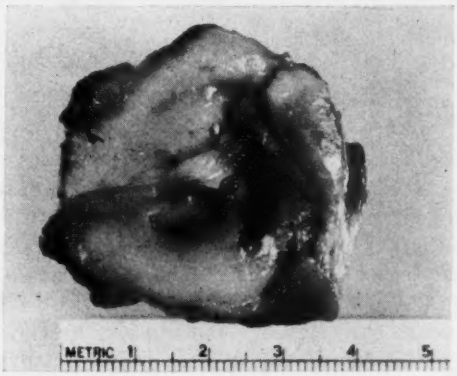

Fig. 5. Chronic cystic cervicitis with endocervical polyp formation.

It is apparent from Table V that lesions encountered were manifold. Empyema of the cervical stump was always associated with cervical stenosis and cervical polyps were frequently accompanied by chronic endocervicitis (fig. 5). Forty-two or 19.9 per cent of the patients had stenosis or stricture of the cervix. Many advocates

TABLE V

Pathology	Total	Per Cent
Cervical Erosion and Chronic Cervicitis	199	89.8
Stenosis or Stricture	42	19.9
Empyema	8	3.6
Epidermoid Carcinoma	10	4.4
Endometriosis	7	3.1
Fibroids	6	2.7
Polyps	20	8.8
Squamous metaplasia	9	3.9
Endocervical hyperplasia	3	1.3
Ulceration	3	1.3
Granuloma	1	.05
Mucocele	1	.05
Leukoplakia	1	.05
Hematotrachelos	1	.05

of supravaginal hysterectomy advise routine cauterization, conization or "coring out" of the cervix at the time of hysterectomy. Since most of the patients in this series were operated on previously elsewhere, it is impossible to determine whether the stricture or stenosis

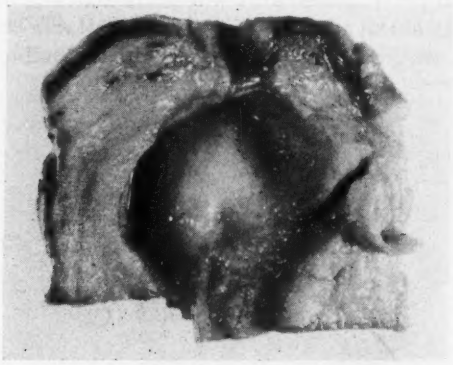

Fig. 6. Chronic cystic cervicitis with stenosis of the external os and "empyema" formation.

developed prior to, as a result of, or following the supravaginal hysterectomy. Probably the majority developed as a result of cauterization, conization or "coning out" of the cervix at the time of

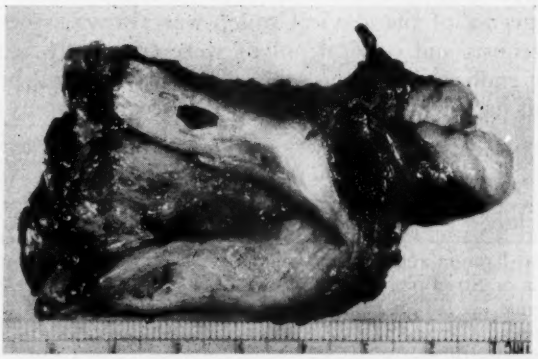

Fig. 7. Endometriosis of the cervical stump with a fibroid at the level of the internal cervical os.

hysterectomy, as only 24 per cent of these patients had the same complaints prior to the initial operation. Presumably then in many cases stricture or stenosis developed as a result of some procedure performed on the cervix at the time of subtotal hysterectomy. In 8 patients empyema of the cervix was noted, causing unexplained

fever, severe dyspareunia and in 3 arthralgic or arthritic symptoms. These symptoms disappeared following excision of the stump (fig. 6).

We were surprised to encounter 7 cases of endometriosis of the cervical stump. It is probable that adenomyosis of the fundus existed unrecognized at the time of hysterectomy, though primary endometriosis of the cervical stump is possible. Fibroids were encountered in 6 patients. Whether these tumors developed in the cervix per se or arose in myometrial tissue left at the time of hysterectomy is difficult to ascertain (fig. 7).

Though this communication is primarily to emphasize benign lesions of the cervix and the symptoms they produce it is not amiss to mention again that 10 cases (4.4 per cent) showed carcinoma of the cervical stump. We do not believe this to be the true incidence but wish to record the fact that 4.4 per cent of a series of 226 cases of cervical stumps, so diseased that surgical extirpation was deemed necessary, showed malignancy. Davis and Cheek[6] recommend that every patient who complains of vaginal bleeding following supravaginal hysterectomy should have the cervical stump biopsied and the cervical canal curetted. We prefer biopsy followed by surgical removal of the cervical stump (fig. 8).

Fig. 8. Carcinoma of retained cervical stump in a normal appearing cervix. Removed because of persistent vaginal bleeding in spite of negative biopsies.

There are many methods of therapy that have been used for the treatment of cervicitis. Antiseptics, applied locally, in the cervical canal or injected into cervical tissue have their advocates. Caustics such as Philo's paste have been recommended. Copper ionization has been championed by others. Sulfa drugs and antibiotics are now

undergoing extensive trial. We admit the efficacy of the latter in acute cervicitis but doubt their efficacy in the chronic case. On our services we rely upon the electric cautery, coagulation, surgery, conization and in some instances hysterectomy for the management of chronic cervicitis. The degree of success attained by the use of any of the latter methods depends upon the proper type of procedure as applied to the type of pathology encountered.

The two basic factors which guide us in the selection of method are: first, the degree of infection as evidenced by hypertrophy, hyperplasia and cystic change within the cervix; and second, the degree of laceration, i.e., whether the laceration has been extensive enough to produce eversion or not. The site of the laceration, or whether it is unilateral, bilateral or stellate has little or no influence on the choice of procedure to be used.

For the cervix without eversion, cauterization or conization suffices. Cauterization is indicated in cases with or without erosion, but having little or no hypertrophy or hyperplasia. For the cervix with marked hypertrophy and/or hyperplasia, conization may be needed to effect cure. The Sturmdorf method though popular on our services as late as 10 years ago is rarely used at present.

The cervix showing marked eversion can rarely be managed satisfactorily by means of cauterization or conization. Again, though trachelorrhaphy for cervices showing eversion with a minor degree of infection; low amputation (Shroeder) for cervices showing eversion with marked disease process limited to the distal half of the cervix; and while high (Hegar) amputation, where the chronic process involved the whole of the cervix with eversion, were popular methods of dealing with the diseased cervix on our services 10 or more years ago, they are rarely utilized by us today.

Though we have mentioned several methods of managing infected cervices, it is to be re-emphasized that in the majority of cases the pathologic changes can easily be controlled by cautery or conization. Rarely is a young woman encountered who complains of such pelvic pain, discharge or dyspareunia, from cervicitis, that deep cauterization or conization will not relieve her discomfort until she has completed her childbearing, and then definitive surgery in the form of hysterectomy can be utilized. Fortunately in the majority of instances where a marked chronic cervicitis is present, many symptoms, such as hypermenorrhea or polymenorrhea and other symptomatic pathology, such as beginning prolapse or prolapse of the uterus, tumors of the uterus, are also present, so that total abdominal hysterectomy or vaginal hysterectomy can be advocated for more than cervicitis alone. It is rare indeed on our private

or ward services that plastic operations about the vagina and cervix, with or without suspension, are advised or performed. We should be conservative in selecting our cases for operation but once operation is advised the surgery should be definitive.

Since approximately 30 per cent of the patients in this series had one or more previous operations for the identical complaints for which they consulted us, it may be assumed that the causal relationship between the cervix and their symptoms was not recognized at that time. A diseased cervix should always be suspected in any woman with pelvic pain, dyspareunia, contact bleeding, backache, leucorrhea, or urinary difficulties. The diagnosis can be easily established by the use of the clinical tests already described.

Many functions have been attributed to the cervix. It has been stated that the cervix is necessary for the support of the uterus and vaginal canal. If the presence of a cervix militated against uterine or vaginal prolapse, then indeed we would see very few cases of prolapse. Also, amputation of the cervix is one of the steps in the Manchester or Fothergill operation, devised for the correction of uterine prolapse. Furthermore we have observed many cases of prolapse of the cervix and vaginal vault that have followed supravaginal hysterectomy and very few following total hysterectomy. If careful approximation of the supporting structures of the uterus, namely the cardinal and uterosacral ligaments, to the vaginal vault is carried out at the time of hysterectomy and if these musculofascial ligaments have the inherent tensile strength they should have, prolapse of the vaginal vault should not occur. Such approximation is easier technically when the cervix has been removed. Of course, correction of any relaxation of the pubocervical fascia and levator fascia should be performed if relaxation exists.

Others agree that the cervix produces secretions necessary for the proper function of the vagina as a sexual organ, and that removal of the cervix lessens or removes the probabilities of orgasm. No argument could be more fallacious. Follow-up records on the large number of hysterectomies performed on our services has not disclosed any case in which the woman has not been able to satisfactorily accommodate her mate, or who, if having had orgasm prior to hysterectomy, did not have orgasm after this procedure. Factual data on the other hand shows that the cervix is frequently a cause of dyspareunia and whereupon prior to removal sexual intercourse was impossible, not desired or without climax, removal of the diseased cervix resulted in a complete reversal of the woman's attitude and reaction.

Some maintain that removal of the cervix at time of hysterectomy results in a shortened vagina. The technic used on our services results in a vagina that is longer than existed prior to total hysterectomy.

Opinion varies as to whether or not total abdominal hysterectomy increases mortality or morbidity. We do not believe that total removal of the uterus increases mortality or morbidity in trained hands, and certainly anyone performing hysterectomy should have had adequate training in this field. In 1941 Miller and Prejean[7] published the statistics relative to hysterectomies performed on the Tulane Gynecological Service at Charity Hospital during the years 1939 and 1940 (Table VI).

TABLE VI

Hysterectomy

Tulane Unit, Charity Hospital, January 1939-January 1940

Type			Mortality
Abdominal	629 (76.1%)	Total 374 (59.6%)	5 (1.33%)
		Subtotal 255 (40.4%)	7 (2.75%)
Vaginal	199 (23.9%)		2 (1.00%)
Cases	828 (100%)		14 (1.68%)

It is seen that in 828 hysterectomies the uncorrected mortality was 1.68 per cent. Of 620 abdominal hysterectomies performed during this period 374 (59.6 per cent) were total. During the period Jan. 1, 1946, to June 1, 1950, on the same service, 1,742 hysterectomies were performed with an uncorrected mortality of .86 per cent (Table VII). Of this number, 1,329 were abdominal in type and 1,223 (92 per cent) were total hysterectomies. Thus, while the number of total abdominal hysterectomies increased from

TABLE VII

Hysterectomy

Tulane Unit, Charity Hospital, January 1946-January 1950

Type			Mortality
Abdominal	1329 (76.3%)	Total 1223 (92%)	7 (.57%)
		Subtotal 106 (8%)	6 (11.3%)
Vaginal	413 (23.7%)		2 (.48%)
Cases	1742		15 (.86%)

59.6 per cent in one period to 92 per cent in a most recent period, the over-all mortality from hysterectomy was halved. Our highest mortality rates are found in cases in which supravaginal hysterectomy is performed. Needless to say supravaginal hysterectomy on our services is reserved for extremely bad surgical risks.

Members of the section on Gynecology and Obstetrics at the Ochsner Clinic have performed 2,000 hysterectomies from the time of its establishment in January, 1942, to January, 1950, with 2 deaths—a mortality rate of .10 per cent. These figures include 21 cases in which radical pelvic surgery with gland dissection was performed for carcinoma of the cervix (Table VIII). Abdominal hysterectomy was utilized in 1,641 cases and of these 1,615 (98.6 per cent) were total in type. To reiterate, the only hysterectomy that should be performed in this day and age, except under very extenuating circumstances, is total abdominal hysterectomy or vaginal hysterectomy.

TABLE VIII

Hysterectomy

Ochsner Clinic, January 1946-January 1950

Type				Mortality
		Total 1615	(98.4%)	1 (.96%)
Abdominal	1641 (82.0%)			
		Subtotal 26	(1.6%)	0 (0%)
Vaginal	338 (16.9%)			1 (.29%)
Radical	21 (1.1%)			0 (0%)
Cases	2000			2 (.1%)

In 1949, 99.3 per cent of the abdominal hysterectomies performed at the Ochsner Clinic were total in type and 98.1 per cent of the abdominal hysterectomies performed at Charity Hospital, Tulane Unit, were total in nature.

The same lesions encountered in the prehysterectomy cervix are found in the cervical stump. If the stump is not diseased, or asymptomatic, observation at frequent intervals is all that is needed. If the disease process is minimal cauterization of the cervical stump gives excellent results in many cases. However, the safest and best procedure is to remove the cervical stump, vaginally. In this series of 226 cervical stumps, all except three were removed vaginally. There were no cases of vaginal or ureteral fistulae resulting. There was no mortality and the morbidity was 2.2 per cent (Table IX). The results obtained are listed in Table IX. Follow-up studies were

TABLE IX

Follow Up

	Total	Per Cent
Mortality	0	0
Morbidity	5	2.2
Etiology: 2 urinary infections, pelvic eviscerectomy 1 phlebothrombosis with vein ligation 1 p. o. hemorrhage requiring packing		
Complete relief	198	87.6
No follow up	25	11.1
No relief at all	1	.05
Partial relief	7	3.1
A total of 70 patients (40 + 30) or 31% had the same complaints as before their subtotal hysterectomy; 27 of these 70 had more than one pelvic operation.		

not available in 11.1 per cent of the patients. Complete relief was obtained in 87.6 per cent, partial relief in 3.1 per cent, and only 1 patient (.05) had no relief whatsoever. The technic used on our services for removal of the cervical stump has been previously described by Tyrone and Weed.[8]

Conclusion

1. The same symptomatology can be produced by benign lesions of the cervix whether the uterus is present in toto or the fundus absent.

2. Whether or not the cervix is the etiological agent in the production of pelvic symptomatology can be diagnosed with a great degree of accuracy.

3. Proper therapeutic methods directed toward the diseased cervix will produce amelioration of symptoms.

4. When hysterectomy is indicated, total abdominal hysterectomy or vaginal hysterectomy are the procedures of choice. Supravaginal hysterectomy should be performed only on the rarest of occasions.

5. In cases where supravaginal hysterectomy has been performed, the cervix should be inspected at frequent intervals. If diseased or symptomatic, cauterization or vaginal excision of the cervix is indicated.

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SACROCOCCYGEAL TERATOMAS

Two Case Reports

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THE sacrococcygeal region is a common site for the occurrence of a variety of tumors, cysts and fistulas. Teratomas are not rare tumors and their most frequent location is in the sacrococcygeal and anorectal regions. They may also occur in the abdomen, pelvis and spinal cord. Sometimes the tumor in the sacrococcygeal region must be differentiated from pilonidal and dermoid cysts and meningomyelocele. Occasionally, the tumor is associated with spina bifida.[1] Tumors vary widely in size, sometimes presenting a mass the size of an infant's head. Others, that are intrapelvic, show no deformity. The tumor may be solid or cystic, unilocular or multilocular, and may be located either dorsal or ventral to the sacrum. Quite often the tumor is pedunculated. Ewing[2] states that a definite connection with bones is occasionally seen and that the sacrum may be rudimentary. The spinal dura, as a rule, is not involved.

According to Pack,[3] the teratoid tumor seldom undergoes cancerous transformation. Stewart, Alter and Craig[4] were able to find only four instances of malignancy from literature. Renner and Goodsitt[5] report a case of malignant tumor infiltrating the rectal wall. De Veer and Browder[6] report 4 cases, only one of which proved to be malignant and which they successfully removed from a six months old infant with no recurrence at the end of two years. They are of the opinion that the large majority of the sacrococcygeal tumors are benign. On the other hand, Fletcher and Waring[7] found in a child, two years of age, extensive intrapelvic involvement with enlarged lumbar and inguinal nodes. Lisco[8] reports 2 cases of congenital sacrococcygeal teratomas in each of which papillary adenocarcinoma with widespread metastasis developed. Willis[9] states that malignant change, usually adenocarcinomatous, may overtake one of the components of a congenital sacral teratoma and the malignant element may metastasize. Fuss[10] describes a case of a woman 31 years old who had a coccygeal mass since birth. Following trauma, an excision was unsuccessfully attempted. At autopsy extensive intrapelvic metastasis and metastasis to the kidney were found. In a series of cases reported by Chaffin,[11] malignant changes in sacrococcygeal teratomas were observed in nearly 9 per cent of the patients. He furthermore relates that, in 72 cases analyzed, 4 infants were stillborn and 11 died within a few days of

birth. Rosedale[12] has reviewed the literature concerning the incidence and theories of genesis of these tumors.

The symptoms are variable, depending on the size and location of the tumor and other anomalies which are very often present. Travaglini[13] reports a case of a child with a vesicovaginal fistula and no urethra. Mirone[14] describes a child 44 days old suffering from a partial intestinal obstruction due to a sacrococcygeal teratoma. Tumor formation may first appear soon after trauma.[15] Many cases have retention of urine and catheterization may be necessary.[16,17] The case reported by Pandalai[18] had retention of urine and also a partial intestinal obstruction. Keen and Coplin[19] found the tumor associated with a spina bifida and a fistulous tract communicating with the rectum through a defect in the sacrum in a two year old child.

Report of Cases

Case 1. J. P., a female infant, 11 months old, was admitted to St. Mary's Hospital on June 5, 1945. Shortly after birth a small swelling on the left buttock was noted. This slowly increased in size. Examination revealed a well developed child with a large tumor mass overlying the sacrum and left buttock which contained solid and cystic areas. The skin over the tumor was intact with pronounced dilatation of the veins. Pressure over the tumor caused

Fig. 1. Case No. 1 before operation.

no bulging of the fontanelles. Rectal examination revealed a mass posterior to the rectum. Operation was done on June 7, 1945, and the tumor was removed. It presented a stalklike attachment to the sacrum. The postoperative course was uncomplicated. Pathological examination by Dr. S. Werthammer revealed an ovoid tumor measuring 16 by 12 cm. The surface was smooth. On opening the mass a large cyst was found. One pole of the specimen showed a solid area measuring 5 cm. The cyst was lined with a smooth covering but in some

areas granular and warty projections were seen. Sections showed predominantly glious tissue with small cavities lined by one row of high columnar

Fig. 2. Gross specimen from Case No. 1.

Fig. 3. Gross specimen of recurrent teratoma, Case No. 1.

epithelium which resembled ependyma. The large cyst was lined by the same epithelium. A few smooth muscle bundles were identified and some lobules of fatty tissue. Diagnosis: cystic teratoma. Grossly and histologically the tumor appeared benign.

On July 8, 1946, the child was readmitted to the hospital with recurrence of the growth on the left buttock. Although smaller, the tumor had a similar appearance to the first tumor removed. The tumor was excised and dissection was carried down, as before, to the sacrum and coccyx. At pathological examination, the specimen was an ill defined lobulated mass, measuring 9 by 6 cm., surrounded by fatty tissue. The cut surface appeared grayish-yellow and solid. There was no capsule and the tumor could not be shelled out. Microscopic examination showed closely packed atypical epithelial cells arranged in cords and nests. The cells had mitotic figures and differed in size, shape, and staining qualities. Diagnosis: anaplastic carcinoma; possible recurrent teratoma.

Fig. 4. Photomicrograph showing predominantly central nervous elements—glia cells, Case No. 1.

Examination on June 22, 1947, revealed a marked loss of weight and x-ray of the chest showed multiple metastatic growths. There was no evidence of recurrence of the growth of the tumor in the left buttock and rectal examination was negative. The child died on Aug. 15, 1948.

CASE 2. J. G., a male, 26 months old, who at birth presented a small slightly raised "dime-sized cyst" over the coccyx, had had a tendency toward constipation for the past six months but had no treatment except an enema at intervals. On Nov. 14, 1947, the parents noted a swelling of the left buttock. Two days later the child had a 24 hour period of anuria and when he finally did urinate, he passed small amounts during a crying spell. Afterwards, he did not voluntarily urinate and it was necessary to catheterize him several times a day. On Nov. 28, 1947, he was seen at an out of town clinic, at which time a retention catheter was left in his bladder. X-ray therapy was advised for the teratoma but was refused. Child was then referred to Dr. George T. Pack who removed the tumor by a combined abdominal and parasacral approach on Dec. 8, 1947, at the Memorial Hospital. The child made an uneventful recovery and bladder function returned. Description of gross pathology by Dr. Groesbeck revealed an elongated oval mass 17 by 6.5 by 6 cm. It was seen to consist

of a mass of solid, moderately soft nodular tissue. Diagnosis: teratoid carcinoma. The child died on Aug. 7, 1948, and the postmortem examination revealed the entire lower abdomen occupied by a retroperitoneal tumor, 25 cm.

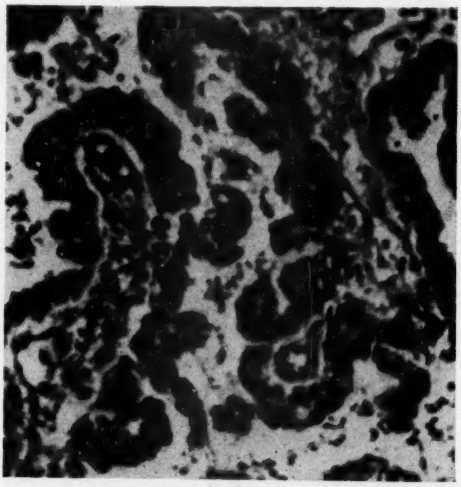

Fig. 5. Photomicrograph showing atypical papillary structures resembling choroid plexus, Case No. 2.

in diameter. The tumor had grown around the urinary bladder, obstructing its caudal portion, and was attached to the sacral bone. The left inferior vena cava had been invaded and there were extensive metastases in the lungs. The liver, spleen, pancreas and intestinal tract appeared unchanged.

SUMMARY

Secondary changes of importance can occur in sacrococcygeal teratoma, giving rise to malignant tumors. However, a large majority of these cases reported in literature are benign. Differentiation from other pathological conditions in this region, such as spina bifida, dermoid cyst and chordoma, seldom offer difficulty.

1. Two cases of congenital sacrococcygeal teratoma are reported, the first of which clearly demonstrates the possibility of malignant change.

2. Early complete excision of the growth is indicated as a prophylaxis against malignancy.

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GASTRIC RESECTIONS AND VAGOTOMIES, MORBIDITY AND MORTALITY IN A GENERAL HOSPITAL, NOT ASSOCIATED WITH A TEACHING CENTER

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THE several reports by Dragstedt on the results following the operation of vagotomy for peptic ulcer have stimulated numerous critical reports on the mortality and end results following subtotal gastrectomy for duodenal, gastric and marginal ulcers. These several reports come from staff members of long established teaching hospitals with tightly closed staffs or from private clinics with full-time surgeons. The author was unable to find a single report from a general municipal hospital not associated with a medical school. This study was therefore undertaken in order to compare the results following subtotal gastrectomy and vagotomy as performed in the various teaching hospitals and private clinics with those performed in a general municipal hospital not associated with a medical school, with no full-time surgeons and with a staff not tightly closed.

This study includes all operations of subtotal gastrectomy and of vagotomy, performed at Jackson Memorial Hospital in Miami, Fla., from July, 1944, through December, 1949. This is a municipal general hospital of 500 beds, ward and private. As stated above, it is not associated with a medical school and has no full-time surgeons and the staff is only quasi-closed. The author dares hazard the opinion that what is found here in regard to postoperative mortality, morbidity and end results may be a fairly close estimate of what we may expect from similar institutions of comparable size throughout the country.

TABLE I*

SUBTOTAL GASTRECTOMIES:	
(July, 1944, through December, 1949)	120
For Duodenal Ulcer	56
For Gastric Ulcer	35
For Cancer	29

SUBTOTAL GASTRECTOMIES AT JACKSON MEMORIAL HOSPITAL

One hundred and twenty subtotal gastrectomies were performed by 22 surgeons in a five and one-half year period, from July, 1944,

*Jackson Memorial Hospital Series—Tables I-VIII.

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through December, 1949. Fifty-six of these operations were for duodenal ulcer, 35 for gastric ulcer and 29 for gastric cancer. Of the 22 surgeons, 16 were from the attending and visiting staffs and 6 were senior residents.

TABLE II

Number of Operating Surgeons

Total Operating Surgeons	22
Visiting Staff	16
Residents	6

There were 12 deaths, an over-all mortality rate of 10 per cent. The incidence of eviscerations was 11.6 per cent and of reoperation because of stomatal difficulties 8.3 per cent. Thus additional surgical procedures were required in about 20 per cent of all cases.

TABLE III

Complications

Deaths	12 or 10%
Embolus	2 or 1.6%
Eviscerations	14 or 11.6%
Reoperation	10 or 8.3%
Injury to Colic Artery	1 or 0.8%

There were three deaths from the 56 operations for duodenal ulcer, a rate of 5.3 per cent, and in the 35 operations for gastric ulcer there were four deaths, a rate of 11 per cent. This is contrary to the results in all published reports, which show a higher death rate from duodenal ulcer due to the difficulties encountered in resecting the ulcers and in effecting adequate closure of the duodenal stump. We can offer no explanation for this finding. In the 29 cases of gastric cancer there were five deaths, a mortality rate of 17 per cent. This higher death rate is to be expected in the cancer cases since the patients are in the older age group, malnutrition is more pronounced and the gastric contents are perhaps more lethal due to

TABLE IV

Mortality According to Disease

	Cases	Deaths	Percentages
Duodenal Ulcer	56	3	5.3
Gastric Ulcer	35	4	11
Gastric Cancer	29	5	17

the low acidity associated with gastric cancer. That age is a most important factor in mortality rate is well illustrated by our results which show a rate of 2.6 per cent in 38 cases under 45 years of age and of 13.5 per cent in 82 cases over 45 years.

When the cases are divided into two periods, 1944 to 1946 and 1947 to 1949, a moderate improvement is shown in the mortality rate, 13.3 per cent for the early and 9.3 per cent for the later period. However, the lowered incidence of eviscerations was rather striking, 20 per cent in the first and 6.6 per cent in the later period.

TABLE V

Mortality by Years

	1944-1946	1947-1949
Number Cases	45	75
Deaths	5	7
Percentage Deaths	13.3	9.3
Eviscerations	9	5
Percentage Eviscerations	20	6.6

Four members of the attending staff operated on 55 of the 120 cases herewith reported. There were three deaths or a rate of 5.4 per cent, whereas, of the remaining 65 cases, operated by 18 surgeons, there were 9 deaths or a mortality rate of 13.8 per cent.

Subtotal Gastrectomies, Published Reports

All published reports show remarkable improvement in mortality rates from year to year. Typical is Fordyce's[1] report from the Presbyterian Hospital in New York where the rate before 1925 was 20 per cent; dropping to 12 per cent during the next 10 years; to 4 per cent during the next 10 and to 2.5 per cent for 1946 to 1947. It is thus evident that reports covering a 20 year or even a 10 year period will show a higher over-all mortality rate than those reports covering only the past one to three years.

Table VI shows mortality rates and number of cases reported from nine different authors, that of the writer being the only report from a general municipal hospital. Fordyce[1] in 394 elective cases of duodenal and gastric ulcer over a 10 year period shows a mortality rate of 6.4 per cent. Marshall[2] in 105 personal elective cases of gastric ulcer over a 10 year period shows 2.8 per cent mortality. Allen[3] in 195 personal cases, all types, reports 5.1 per cent mortality. Gardner and Hart[4] in 123 cases during an eight year period, a rate of 8.9 per cent. Rienhoff[5] in 260 cases, a rate of 2 per cent. Ransom[6] in 168 elective cases of gastric ulcer, a rate of 7.9 per cent over a 20 year period. Lahey[7] in 552 cases, a rate of 2.5 per cent.

Gray[8] in 223 personal elective cases of duodenal ulcer, a rate of 6.2 per cent over a five year period. The author reporting on 120 cases by 22 surgeons over a five and one-half year period, shows a rate of 10 per cent.

TABLE VI

Mortality

Author	Cases	Type Case						
		All Inclusive	Duodenal	Gastric	Elective	Deaths	Mortality %	Years
Fordyce	394	No	Yes	Yes	Yes	25	6.4	10
Marshall	105	No		Yes	Yes	3	2.8	10
Allen	195	Yes	Yes		No	10	5.1	?
Gardner	123	Yes			No	11	8.9	8
Rienhoff	260		Yes		?	5	2	?
Ransom	188	No		Yes	Yes	15	7.9	20
Lahey	552	Yes				10	2.5	?
Gray	223	No	Yes		Yes	14	6.2	5
Stewart	120	Yes			No	12	10	5½

Discussion

Subtotal gastrectomy is a formidable procedure. The difficulties are well expressed by Lahey,[9] ". . . there has been no operative procedure with which we have dealt which has been more difficult to standardize successfully, and in which it has been harder to eliminate complications and reduce mortality, than that of total and subtotal gastrectomy." Except in the most experienced hands complications are many and serious. Biliary fistulae, duodenal blowouts, serious wound infections, eviscerations and stomatal obstructions are not unheard of in most reports. The difficulties of the operation and the many variable factors influencing mortality rate, such as age of the patients; whether the indication be duodenal ulcer, gastric ulcer or cancer, and whether the operation be done as an elective or emergency procedure, make it difficult or impossible to arrive at an accurate over-all mortality rate for the hospitals of the country as a whole. The most important of all the variable factors influencing results is the ability and experience of the individual surgeons and this variable, of course, does not lend itself to generalizations.

It is thus quite evident that there is no one mortality rate. The rate of any one hospital is easy to determine, but the important thing to remember is that the rate of a hospital as a whole is in no way the rate of the individual surgeon. It is unwise and unfair for any surgeon, until he has by his own results proved that to be the

case, to delude himself into believing that his mortality rate from subtotal gastrectomy will be as favorable as that of the more experienced surgeons.

Vagotomies

At Jackson Memorial Hospital, 17 vagotomies have been performed, three transthoracic by two surgeons for marginal ulcer and 13 subdiaphragmatic by or under the supervision of one surgeon; 3 of these for marginal ulcer, 8 for duodenal ulcer and 3 for gastric ulcer. There were no deaths. Table VIII shows the complications; one evisceration; one reoperation to do a necessary gastroenterostomy for drainage; two reoperations for stomatal obstruction and one splenectomy necessitated by inadvertent injury to the spleen.

TABLE VII

Vagotomies

Transthoracic	3	by 2 Surgeons
Abdominal	13	by 1 Surgeon
	3	by Residents

TABLE VIII

Complications of Nineteen Vagotomies

Deaths	0	0%
Eviscerations	1	5.2%
Reoperation	1	5.2%
Intestinal Obstruction	2	10.5%
Embolus	0	0%
Injury to Spleen	1	5.2%

As compared to the difficulties of gastrectomy, section of the vagi below the diaphragm is a relatively simple procedure. Standardization is much easier; complications are less ominous and less frequent. When gastrojejunostomy is added, then stomatal difficulties arise, difficulties which experience alone will prevent.

A review of the many articles on vagotomy that have appeared during the past four years shows rather conclusively that the mortality rate is less than 1 per cent. It is not the purpose of this report to enter into the relative merits of vagotomy and gastrectomy for duodenal ulcer since this series is too small and our study of end results too inefficient to offer a contribution of any value to the already chaotic diversity of opinions expressed in medical and surgical journels at the present time. However, it is suggested that in attempting to evaluate and compare any two procedures, the sur-

gical mortality and morbidity is of primary importance, especially, when we have under consideration a benign condition such as duodenal ulcer. Therefore the author recommends that each surgeon give careful consideration to his individual mortality and morbidity rates following both subtotal gastrectomy and vagotomy for duodenal ulcer, as well as an accurate appraisal of end results.

Conclusions

The mortality rate following subtotal gastrectomy, in the hands of the most experienced, is about 3 per cent. It is probable, however, that the rate in many general hospitals throughout the country is many times as high.

The mortality rate following vagotomy has, up to the present, proved to be less than 1 per cent and it is possible that this rate will not show significant rise even when the operation becomes more widely used.

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RECURRENT PANCREATITIS

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Until recently pancreatic disease has received treatment essentially palliative and has been considered a condition more responsive to medical therapy than to surgical treatment. In fact, it might be said that the pancreas was considered to be the surgical stepchild of all the abdominal organs. This was due, for the most part, to the lack of knowledge as to the etiology and treatment of many pathological conditions of this organ and to its inaccessible position and anatomical relationships, making surgical procedures difficult and hazardous. The pancreas is now subject to surgical attention following inflammation, injury, or the presence of tumors, either malignant or benign. This paper will confine itself solely to the syndrome of recurrent pancreatitis, thus excluding many of the diseases that affect the pancreas.

In 1901, Opie[1] focused the attention of surgeons on his observation that acute pancreatitis could be produced by retrograde injection of bile into the pancreatic ducts when the ampulla of Vater was occluded by a stone. Further studies by Archibald[2] in 1919 showed that a similar bile-diverting mechanism could be brought about by a spasm of the sphincter of Oddi. This spasm, theoretically, converted the bile and pancreatic ducts into a common channel. It was believed that the presence of bile in the pancreatic ducts initiated the pancreatitis. More recent observations have proved that the bile reflux is not the only important factor in pancreatic inflammation. Instances of this are those cases with acute pancreatitis in the region of the gland which were drained entirely by the accessory pancreatic duct of Santorini.[3] This duct has a separate opening in the duodenum apart from the bile duct. Puestow, et al, in a series of autopsies in cases of acute pancreatitis, found in some instances the bile and main pancreatic ducts entered the duodenum by separate openings. Well controlled experiments of late have thrown a good deal of light on the predisposing factors producing pancreatitis. Tejerina-Fotheringham[4] came to the conclusion that the obstruction and infection of the pancreatic ducts are the principal factors in producing pancreatitis. He has found in some instances that the stricture present in the lower end of the common duct is not due to outside pressure from the pancreas, but to thickening of the walls of the common duct and ampulla. He believes in-

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fection is the principal cause of the stenosis. This may also occur in the pancreatic ducts.

Edema of the pancreas is possibly another obstructive factor as the gland is known to become edematous under vagal stimulation. This edema is probably due to the stoppage of secretion in the cells or a spasm in the ducts. Further possible cause of obstruction is edema of the duodenal wall. This is known to occur after alcoholic bouts, the later being recognized as a common precipitant of pancreatitis. Alcohol also stimulates gastric and pancreatic secretion and with obstruction of the ducts, could lead to pancreatitis. Lium and Maddock[5] produced inflammatory lesions of the pancreas and fat necrosis by ligating the pancreatic ducts and stimulating the gland artificially or by feeding the animals. However, no hemorrhagic areas or evidence of necrosis resulted. Popper, et al,[6] did cause a transition from pancreatic edema to pancreatic necrosis by temporary occlusion of the main pancreatic artery. They believe that this temporarily lowered the resistance of the cells to the enzymatic action of the edema fluid and that, clinically, the degree of vasoconstriction determined the degree of pancreatic necrosis. If such vasoconstriction exists in human beings with pancreatitis, it may be due to shock, pain, or other factors stimulating a vasoconstriction in the splanchnic area.

With the development of simple laboratory procedures for the determination of serum amylase, the diagnosis of pancreatitis has been made more accurate and reveals several facts regarding this entity. It is not a rare disease and it varies in intensity from mild attacks to a fulminating catastrophe. Fortunately the latter event is relatively uncommon. Pancreatitis is frequently associated with biliary tract disease, many disorders heretofore termed postcholecystectomy syndrome, biliary dyskinesia, etc., are actually recurrent attacks of pancreatitis. It has been recently stated that there is an associated disease of the biliary tract in 70 to 80 per cent of these cases.[4]

Acute fulminating pancreatitis responds better to conservative treatment than to early surgical procedures. It has been repeatedly shown in large groups of cases that the mortality is lower in nonoperated cases.[7,8] For this reason, this phase of pancreatitis will not be considered.

Recurrent pancreatitis is manifested by recurring attacks of pain in the upper part of the abdomen which may be of long or short duration. Disturbance of the function of the pancreas may be transitory and mild unless repeated attacks have caused widespread destruction of the acinar and islet cells. Damage may occur to the

extent that the internal and external gland secretions become deficient leading to creatorrhea, steatorrhea and diabetes with hyperglycemia. In long-standing disease with fibrosis or calcification of the gland, there may be no rise in the serum amylase, or the level may even be low during the exacerbations of the pancreatitis. Roentgenological studies of the pancreas may show lithiasis or calcifications; the pancreas may be cystic, fibrosed, or enlarged and palpable. The latter, in turn, may cause obstruction of the common duct with obstructive hepatitis and jaundice, partial obstruction of the duodenum or obstruction of the splenic and superior mesenteric veins with splenomegalia and occasional massive gastrointestinal hemorrhages.[9,10] Many authors have described the various phases of pancreatitis as separate entities. This is usually based on the differential pathological picture in each phase, such as "edematous pancreatitis," "hemorrhagic pancreatitis," or "fibrosis of the pancreas." But these merely represent steps in the progression of disease.

The symptoms of pancreatitis are often perplexing. The pain and tenderness accompanying this condition are usually intermittent and may be difficult to distinguish between gallbladder colic, ruptured peptic ulcer or high intestinal obstruction. In some instances the pain is mild and jaundice is the chief complaint. The onset of pain may be abrupt and have its site in the mid-epigastrium, right or left upper quadrant, in the periumbilical region or it may be generalized over the abdomen. It may radiate to the thoracic or lumbar regions. It has been stated that in a general way the disease at the head of the pancreas causes pain to extend to the right hypochondrium and right shoulder and disease of the body and tail causes pain to extend to the left hypochondrium. Opiates will not often give complete relief and do not terminate an attack as they so often do in biliary colic. Muscle spasm is commonly present but the board-like rigidity which accompanies a ruptured viscus is seldom observed. The position taken by the patient may be characteristic. A flexed sitting position may be assumed with the patient applying pressure against the mid-abdomen. Nausea and vomiting are occasionally present. The temperature may, or may not, be elevated. Abdominal distention is a common finding. The patient perspires freely and may be quite restless. Before serum amylase determinations were commonly used, the incidence of correct diagnosis prior to operation or autopsy was low. The diagnosis is still too infrequently made because pancreatitis is not considered in the differential diagnoses due to lack of awareness by the clinician. A number of these cases are diagnosed as "anxiety states" when in truth organic disease exists and should be recognized to do justice to the patient. The serum amylase determination is the most reliable aid

we have in the diagnosis of the disease. It is usually elevated within 12 hours following the onset and maintains this elevation for 24 to 96 hours. A roentgenogram of the abdomen is of positive diagnostic aid when pancreatitis has been accompanied by calcareous deposits. The leucocyte count, sedimentation rate and prothrombin time may or may not be elevated. The attacks are often initiated by a heavy meal or by the ingestion of alcohol. The acute manifestations tend to recur. When the patient is seen in the intervals between the attacks and the diagnostic sequelae of pancreatitis have not been developed—that is, steatorrhea, diabetes, or deposits of calcium in the pancreas, a presumptive diagnosis can be made on the history of the past acute attacks. The secretin test has been recommended as a further aid in establishing the diagnosis.[11] Briefly, the technic is as follows: A Rehfuss tube is passed into the duodenum and 17 mg. of diluted secretin is injected intravenously. Ten, 20, 40 and 60 minute samples of duodenal juice are collected and analyzed for bicarbonate and amylase. The decrease from the normal amount of volume, bicarbonate and amylase units are of diagnostic value in showing impairment of pancreatic function due to pancreatic destruction.

The following cases are illustrative of this condition:

CASE 1. This illustrates the improvement following removal of a diseased gallbladder and T tube drainage. Mr. G. C. D., a white male, aged 55, entered the hospital as an emergency case on April 3, 1946, complaining of severe epigastric pain, nausea and vomiting and extreme weakness. The day before admission, following his evening meal, the patient began having severe upper abdominal pain starting in the midline and radiating to the back. He became nauseated and vomited. The pulse was 100; temperature 100.4 F.; blood pressure 160/90; distention of the abdomen was present with marked tenderness in the epigastrium and there was upper abdominal rigidity with rebound tenderness. The blood amylase was 30 mg. (normal 20 to 40 mg. per 100 cc.; red blood count and hemoglobin were normal; leukocytes were 10,600 with a definite shift to the left in the differential, the urine contained albumin (2 plus); 7 to 8 leucocytes and 2 to 3 erythrocytes. The patient was taken to surgery with a preoperative diagnosis of mesenteric thrombosis. Numerous areas of fat necrosis were seen. The pancreas was enlarged, hard and had all the gross signs of an acute pancreatitis with edema and hemorrhage. He had a stormy convalescence and was discharged from the hospital on May 26, 1946, ambulatory and improved. He was readmitted to the hospital on July 17, 1948, at which time he was seen by another physician who made a diagnosis of duodenal ulcer, penetrating in character. On conservative treatment the patient's symptoms subsided and he left the hospital on July 23. On March 28, 1949, the patient experienced a similar attack. This was not aided by large doses of opiates and lasted for 36 hours. For a week following this there was residual epigastric tenderness. The patient was operated on on April 20, at which time the common duct was found to be about twice its normal size. There were dense adhesions entirely around the common duct, pancreatitic and gallbladder areas. The pancreas was enlarged, hard and nodular.

The gallbladder was thickened and contained many small stones. Cholangiograms did not show obstruction in the ampulla of Vater. A T tube was anchored into the common duct and a cholecystectomy was done. No evidence of recent or past peptic ulcer was found. A cholangiogram taken on June 28 showed free passage of the opaque material into the duodenum. It is also of interest to note that the pancreatic ducts had a common opening with the bile duct into the ampulla. The T tube was removed on July 8, and he has had no further complaints.

CASE 2. Recovery following choledochoduodenostomy. Mrs. M. C., a 41 year old white female who entered the hospital for the third time on Aug. 2, 1948. In May, 1947, she had a cholecystectomy at which time the gallbladder was found to be full of stones. The common duct appeared to be normal. She was readmitted to the hospital in May, 1948, following the ingestion of 76 grains of phenobarbital, showing all the signs of a barbiturate poisoning. After recovery from a glomerular nephritis, bronchopneumonia and liver damage, she was discharged on June 18. After leaving the hospital she had three episodes of pain in the epigastrium with vomiting and fever. She became jaundiced and her stools became light. She had been an alcoholic for years but joined "Alcoholics Anonymous" and had not taken an alcoholic drink during the past three years. Her skin was markedly jaundiced and the sclerae were yellow.

Abdominal examination showed the liver down 3 fingerbreadths below the costal margin. It was slightly tender and was firm and smooth. On Sept. 9, the patient was operated upon and it was found that the pancreas was large and nodular and the common duct greatly dilated. A T tube was inserted into the common duct and a cholangiogram was made, showing an obstruction in the distal portion of the common duct. A biopsy was taken of the pancreas and the liver and the abdomen was closed. Pathological diagnosis of the tissues removed showed a biliary cirrhosis of the liver and mild fibrosis of the pancreas. Postoperative cholangiograms were made at intervals and it was found that the pancreatic area of the common duct remained stenosed. As a consequence, she was reoperated upon on Jan. 24, 1949, with a preoperative diagnosis of chronic sclerosing pancreatitis with occlusion of the distal end of the common duct and a choledochoduodenostomy was done over a T tube. The patient had a normal convalescence and the T tube was removed three months postoperatively. Thus far she has had no further symptoms.

CASE 3. Recovery following T tube drainage. Mrs. M. S., a 53 year old white female, entered the hospital with a complaint of abdominal pain on Oct. 15, 1942. Thirteen years previously this patient began to have attacks of pain across the upper abdomen and upper back. At first, she noted "indigestion" following the intake of gasforming foods and was relieved by vomiting or by Epsom salts. In 1938 she was x-rayed and found to have a stone in the gallbladder. A cholecystotomy was done and the incision drained for nine months. Following closure of the wound the pain recurred and two years later a cholecystectomy was done. After this surgery much relief was obtained, but she noted several attacks of pain in the upper abdomen with chills and jaundice. Physical examination at the time of admission showed a blood pressure of 122/72 and moderate jaundice. Abdominal examination showed a scar in the upper right quadrant and the liver was found to be enlarged down 2 cm. There was tenderness in the epigastrium. Laboratory work showed a normal urine; normal serology; icteric index of 42.8; normal red blood count and a white count of 16,100. The patient was operated upon on Oct. 24, 1942, with a preoperative diagnosis of stone in the common duct. At opera-

tion the diagnosis of chronic pancreatitis was made. The common duct was found to be dilated with thick walls and the pancreas was nodular, enlarged and hard. A T tube was sutured in the common duct and a cholangiogram was made on the operating table. The x-rays showed almost complete obstruction of the common duct in the region of the pancreas. In three months a cholangiogram demonstrated that the distal duct was open and the T tube was removed. The patient was last heard from in August, 1948, at which time there had been no recurrence of her previous illness.

CASE 4. Relief of symptoms following cholecystectomy and T tube drainage. May later need a sphincterotomy. Mr. R. C., a 41 year old white male, entered the hospital on March 30, 1949, complaining of epigastric pain radiating to the back. On the afternoon before admission the patient had had a couple of "beers" and the attack began following the evening meal of that date. The patient had had his first attack in 1942 while in the army. He was in an army hospital at which time x-rays of the gallbladder and gastrointestinal tract were all negative. The diagnosis of chronic gastritis was made. Since that time he has had four other hospital admissions with the same complaints. On Dec. 24, 1948, the patient had a number of drinks of whiskey following which he had a violent attack of epigastric pain which radiated to the back and right shoulder. At that time a blood amylase was 400 mg. and the diagnosis of chronic relapsing pancreatitis was made. X-rays taken on this last admission showed an essentially normal gastrointestinal tract; normal gallbladder studies; the stools were normal with no excessive fat; serology was negative; urinalysis was normal; blood count was normal except for the white blood count which showed 10,500 leucocytes. Electrocardiographic tracings were normal. The patient was operated upon on April 6, 1949, at which time the gallbladder was found to be thickwalled, emptied poorly, but contained no stones. The common duct was dilated with greatly thickened walls. The pancreas was nodular, hard and about three times its normal size. A small urethral catheter could be introduced through the common duct into the duodenum, but a number 14 catheter would not pass the obstruction at the distal portion of the common duct. A cholecystectomy and T tube drainage of the common duct was done. Thus far, he has been relieved of his distress.

CASE 5. Results questionable thus far. May need a sympathectomy for relief of pain. Mrs. G. G., a white female, aged 58, entered the hospital on March 13, 1949, for the fifth time, complaining of epigastric pain, intermittent diarrhea, and tenderness in the right upper quadrant. She first entered the hospital in February, 1940, at which time her gallbladder was removed. She states that she has not felt well since she was first jaundiced in 1940. Her blood pressure was 120/80 and she appeared undernourished. The abdominal examination showed tympany, moderate distention and tenderness throughout the epigastrium. There was a mass in the mid-epigastrium above the umbilicus which was movable and tender. The liver was moderately enlarged, tender and firm. Gastrointestinal x-ray series were essentially normal. Barium enema was negative. Laboratory work showed a normal blood count; normal sedimentation rate; normal liver function tests; blood amylase was 15; serology negative; normal urine. Her temperature was normal. She revealed that she had recently been passing stools which were covered with a substance appearing like mineral oil which flowed off the surface of the stool. Apparently fatty stools. The interesting part of this report was that in 5 admissions a diagnosis of chronic relapsing pancreatitis was not made until the last admission. The icteric index on several occasions was found to be elevated above normal. On

June 22, 1949, the patient was operated upon and a large pancreas was found to be the mass which had been tender and palpable preoperatively. A biopsy was taken which revealed chronic pancreatitis. A T tube was anchored in the common duct. Cholangiograms taken at the time of surgery were not conclusive but cholangiograms on the tenth postoperative day showed free passage of the opaque material into the duodenum and there was no evidence of the pancreatic duct leading into the ampulla. On medical management the patient has improved but if there is a recurrence of symptoms, a sympathectomy for relief of pain will be contemplated.

The treatment of this disabling condition is chiefly surgical. Conservative medical treatment offers little permanent relief and usually the disease is progressive. Medical measures are to be followed during the acute attack, at which time fluids, gastric suction and accepted measures for controlling shock are used as indicated. Inhaling of amylnitrate or taking nitroglycerin by mouth has been reported as giving relief during the acute attacks. Penicillin should be given to combat infection. Alcohol should be forbidden. Pancreatic enzyme deficiency should be controlled by pancreatin tablets and insulin, as needed. Fifteen grams of pancreatin daily will reduce food loss as much as 50 per cent.

Surgery is the indicated treatment for the relapsing cases and is the only means of producing relief from exacerbations and pain. The surgical procedures vary with the different forms of the disease. Cholangiograms should be done at the time of surgery and will often give valuable information as to what would be the best surgical procedure. If the cholangiograms show a common opening between the pancreatic and bile duct, the sphincter of Oddi should be cut. The results of this procedure as recently reported by Doubilet and Mulholland have been most encouraging.[12,13]

In all cases of gallbladder surgery, the pancreas should be explored. The most important information that can be obtained regarding the pancreas is often found at this time. Conversely, should chronic pancreatitis be found and there is evidence of biliary disease, a cholecystectomy and choledochotomy with drainage by a T tube of the common duct is usually indicated. The T tube should be allowed to drain from 3 to 12 months. The advantage of the cholecystectomy was emphasized by Judd[14] who reasoned that it would prevent the forceful propulsion of concentrated bile into the pancreatic duct, diminish bile salt concentration and result in a relative atonicity of the sphincter of Oddi. Should a narrowing of the pancreatic portion of the common duct be present, due to edema or stenosis, a choledochoduodenostomy is an efficient procedure.[15] It has the double advantage that it will automatically close if the common duct eventually opens. If the pancreatic disease is in the stage of calcification and associated with severe pain, it may be

advisable to resect a portion of the pancreas. This is a difficult and hazardous procedure, however, and more conservative measures should be given a thorough trial. Relief of pancreatic pain may be obtained by a thoracolumbar sympathectomy,[16] but it is important to precede this operation by a posterior splanchnic block as a diagnostic procedure.

Ray and Console[17] have shown that the pain sense from the pancreas was mediated by visceral afferent nerves that traverse the celiac plexus, the splanchnics and the sympathetic chains on both sides and state that the vagus nerve plays no part in the transmission of pain from the pancreas. The minimal operation they found to provide analgesia for the pancreas is unilateral, or, if needed, bilateral, resection of the gangliated chain from the eleventh thoracic to, and including, the first lumbar and of the lowest 8 cm. of the greater splanchnic nerve.

Conclusion

Chronic relapsing pancreatitis is a relatively common disease. It is often misdiagnosed, but the diagnosis is not difficult if the condition is considered in a differential diagnosis of those conditions causing upper abdominal pain. Medical treatment is usually only palliative and the best and most permanent relief is afforded by surgery.

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HEMANGIOSARCOMA (HEMANGIO-ENDOTHELIOMA) OF THE STOMACH

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THE rarity of a lesion does not necessarily denote its clinical importance. This is particularly true of gastric sarcomas of which there have been reported more than 500 cases. Sarcoma of the stomach constitutes about 1 per cent of all gastric malignancies.

The classification of gastric sarcomas is not clear, but the relative frequency of the specific type is as follows:

Lymphosarcoma	39-60 per cent
Leiomyosarcoma	6-16 per cent
Fibrosarcoma	14-22 per cent
Neurosarcoma, Liposarcoma, Hemangiosarcoma	5 per cent

Hemangiosarcoma of the stomach is indeed rare. Ony 6 case reports have been found after careful study of the literature. The lesion accounts for only 1 per cent of all gastric sarcomas.

The etiology is unknown. The sexes are about equal; three women and two men are recorded. The age incidence ranges from a 10 year old boy to 66, and averages 40 years. The location, as with other types of sarcoma, is more commonly on the lesser curvature, in or near the antrum. Anatomically the tumors may be intramural with a tendency to infiltrate and ulcerate the mucosa or they may become exogastric in position as the case of Burty. The histopathology shows the origin of the tumor to be in the endothelial cells of the blood vessels. It is composed of oval or spindle-shaped cells having a tendency to form new blood vessels and vascular spaces filled with erythrocytes and lined with tumor cells. The degree of malignancy is low and metastasis late and slow. All the cases reported have eventually died of their disease, but the survival times recorded are 2½, 4, 17, and 13 years.

The clinical importance of this unusual lesion is that the prognosis is so much better than carcinoma of the stomach. Lemon and Broders, Schroeder and Schattenberg, D'Aunoy and Zoeller and others have commented on the improved prognosis and statistical estimates on longevity are from 3½ to 4 years.

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Case Report

V. G., a white male, aged 66 years, was first seen Nov. 17, 1945. A traveling salesman who had always been a heavy eater and drinker. Six months prior (May, 1945) he had a stroke with a right hemiplegia, thickness of speech, but no loss of consciousness. At the time of the stroke he vomited some blood. He recovered within a few days and studies showed a marked anemia to be present (9hgb.). He denied any other episodes of melena, hematemesis, or any digestive disturbance. There had been no weight loss. The patient describes himself as a "high liver."

The pertinent findings of the physical examination were a husky, overweight, well developed, white male. Blood pressure 160/90.

There was a small indefinite, slightly sensitive mass in the epigastrium which moved with respiration. A small epigastric hernia was also noted. The blood and urine studies were normal. Kahn negative.

X-ray study of the stomach in November, 1945, and repeated on November 26, 1945, showed a deforming lesion with a crater near the lesser curvature which could not be emptied.

Laparotomy was performed on Nov. 28, 1945, under continuous spinal anesthesia. Exploration was carried out and no evidence of metastatic tumor could be found. The stomach was easily delivered. On the anterior surface of the proximal antrum, adjacent to the lesser curvature, there was a firm, purple-colored, ovoid mass. The mass was about the size of a hen's egg, measuring approximately 6 cm. in diameter. It appeared to infiltrate the stomach wall in a radial manner. The ulcer crater was about 2 cm. in diameter and had a smooth surface but communicated through its center with a larger cavity in the center of the tumor. The lesion was grossly hemorrhagic, firm in some areas, friable in others. There was no evidence of lymph-node or liver involvement. A subtotal gastrectomy and Hofmeister gastrojejunostomy were easily done.

The postoperative course was uneventful and the patient was discharged to his home on the twelfth postoperative day.

He was seen at regular intervals thereafter. He developed a large incisional hernia which facilitated abdominal palpation.

In January, 1948, the liver was noted to be diffusely enlarged, smooth, nontender and 4 fingerbreadths below the costal margin.

On March 10, 1948, while out of the city, he developed acute, upper abdominal pain and fever. On his return a few days later examination disclosed that the liver had enlarged further and was tender. There was a large, tender, cystic mass the size of a baseball, easily palpated through the hernia site. The lobes of the liver were roughened, but no other definite masses or nodules could be made out.

The tentative diagnosis of (1) metastatic liver disease, (2) acute cholecystitis with hydrops, or (3) cirrhosis of the liver were considered. He was treated expectantly and the fever subsided, although the tender cystic mass persisted. One week later the abdomen was re-explored. Diffuse extensive tumor metastasis was found in the liver, the cystic mass arose from the enlarged left lobe of the liver. The involved right lobe almost filled the right flank and iliac areas. Biopsies were taken and the abdomen closed. He expired on the third postoperative day with terminal coma and fever of 105° F.

Autopsy confirmed the operative findings. Only three preaortic lymph nodes were found to be involved by the tumor. There was no evidence of recurrence in the stomach or anastomosis. Other findings were mild pyelonephritis, hydronephrosis, myocardial fibrosis and hypertrophy and hypertensive heart disease.

SUMMARY

1. Hemangiosarcoma of the stomach is a rare lesion of low grade malignancy.

2. The literature has been reviewed and one case report added.

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FAMILIAL UROLOGICAL DISEASES

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A CAREFUL review of the literature including textbooks relative to the tendency towards the occurrence of familial diseases of the urinary tract reveals only brief mention with the exception of the description of polycystic degeneration of the kidneys.

The occurrence of a similar lesion in the genito-urinary tract in several members of the same family appears to be more than mere coincidence.

In a review of over 10,000 patients, the frequency of such conditions as calculi in the urinary organs, polycystic kidneys, and hypertrophy of the prostate gland have occurred in several members of the same family so often that an attempt is being made to determine whether familial tendencies exist. This occurrence may appear from the maternal or paternal side to several members of the same family in both sexes with the exception where the prostate gland is involved.

Because of the frequency of these conditions in families the author believes that other factors besides those that we are familiar with play a part in their production. Such factors as hormones, vitamins, transporting of certain elements in the blood from patient to offspring may play a part.

Research studies of this kind are being made at the Hoffberger Urological Research Laboratory of the Sinai Hospital and while we are not prepared to make any definite statement as yet, we are willing to believe that familial tendencies exist and that they are not merely coincidental.

Since we have sufficient clinical material to study from, while the other investigative studies are going on, we would like to go on record with some of the results of our studies in our clinical cases.

We therefore have studied mainly three diseases with relation to familial tendencies: (1) urinary calculi, (2) polycystic degeneration of the kidney, (3) prostatic hypertrophy.

Urinary Calculi. In 8 per cent of our urinary calculi cases, there was a history of a similar condition in one of the parents, divided respectively into 5 per cent on the paternal side and 3 per cent on the maternal side. At the same time 10 per cent of the cases gave

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a history of either a brother or a sister having had a similar condition, while 3 per cent gave a history of both a brother and a sister with the same condition.

It has always been felt that race, climate, environment, type of food and water, infections, vitamin deficiencies, sedentary life, tumors of parathyroids, etc., all play a part in the formation of urinary calculi and they probably do, but there still must be other factors which have not yet been determined that undoubtedly play a part.

We are not going to attempt to enter into any lengthy discussion as to the etiology of the formation of urinary calculi, or to the part that climate, water, food, metabolism, infection, etc., play in their production, because it is generally believed that all the above play some part. Nevertheless, it is interesting to note that a child, the offspring of a couple, one of whom had calculi, enters into matrimony with a partner who is the offspring of another couple neither of whom ever had urinary calculi, yet living in an entirely different climate, indulging in different water, different environment and in most instances different food, the individual who was the offspring of the stone producer proceeded in many instances in our series to form stones, the same as the parent. LeRoy de'Etoilles reported the history of eight brothers, all living in different parts of Europe, all of whom suffered from stone formation. And for argument's sake, let us admit of indulgence of the same food, same water, same environment, etc. Why does not the partner develop calculi if the above should play a part? It is rather unusual to find two individuals united, representing two different families, one from a stone-producing family and the other not, to find that stones are produced in both of them. Instances of this kind invalidate the theory of food, environment, water, climate, etc., playing any great part in the production of calculi. It would seem that the blood, the structural make-up of the kidney and some undetermined factors may play some part in their production.

There have been cases reported by Herman and others where calculi of the uric acid consistency have been removed from 5 members of the same family. Yet after elimination of foods, water, etc., that may go to produce calculi if a uric acid diathesis exists, uric acid crystals were still found in the urine. Individuals with oxalate stones who are advised the elimination of vegetables and fruits which are rich in oxalates, continue under any circumstances to form stones in many instances in our series.

Disturbances of metabolism, deficiencies in vitamin A, hyper-

parathyroidism and possibly other endocrine disturbances may lead to the formation of stones.

In this series faulty metabolism which is supposed to play a part in the production of gout and renal calculi made up a very small group of our cases. While hyperparathyroidism plays a part in the production of urinary calculi, there were only 2 cases in our series. Likewise dietary deficiencies or imbalances may be factors in their production, but as cited above never proved a definite point.

Relative to infection and stasis it has been observed that uric acid, urate and oxalate renal stones are rarely associated with any demonstrable infection. In several series of cases reporting on urinary calculi by various investigators, the urine was found sterile in most instances.

Bacteriologic studies in urinary calculi are of rare etiologic significance. It has been observed that urinary infection has existed for years in the absence of stone formation. Chronic infections of the kidney are frequently observed to be free from stone formation. Stone formation in the presence of tuberculosis of the kidney is only a rare occurrence.

Whether one believes that familial tendencies exist or not, there certainly was a sufficiently high percentage of cases in this series that definitely pointed to familial tendencies. In 1940, J. Swift Joly, in his book on calculous disease of the urinary organs, in the chapter on heredity in association with stone formation, states that the cases of stones in several members of the same family are distinctly rare. We regret that we are compelled to differ with Joly since our studies show, to repeat, that in 8 per cent of our cases one parent or the other gave a history of stone formation and that 10 per cent of our stone cases gave a history of either a brother or a sister with the same condition, and 3 per cent where both a brother and a sister had the same condition.

One might think that possibly a difference in race might answer the problem, but it does not, since this series of stone cases is comprised of 79 per cent of Jewish patients and 21 per cent of non-Jewish patients, and the existence of stones in these cases were relatively about the same. But even were there a great difference, then one still could say that it might be a Jewish familial tendency, as diabetes is.

In favor of our thought of the possibility of stone formation being a familial disease in some instances, is the citation of a case by Clubbe, who mentioned a family of six children all of whom had stones. Both the father and mother passed large quantities of uric

acid, the grandfather and grandmother, six uncles, four aunts and a cousin all suffered from gravel, several of whom had been operated upon.

Clubbe attributed the above case to an unsuitable dietary or defective personal hygiene and to the fact that such habits were passed down from parent to child.

The above may be true but it could be questioned. But how about Etoilles' case of the eight brothers all living in different parts of Europe?

Certainly those cases are rather typical cases of familial tendencies and show that more than food, habit, climate, and environment play a part.

Polycystic degeneration of the Kidney. In the study of polycystic disease of the kidney in this series, it was found to have occurred in 41 families involving 103 individuals and probably would have demonstrated many more but for either the refusal or the delay in examination.

There are many unsettled factors in the three mentioned lesions. In the case of polycystic disease, we are all quite satisfied that it is an hereditary and congenital disease. We are not all quite satisfied as to the reason for its production. The explanation that most of us have accepted for the time being is that it is an embryological defect, which it is, but why, and why only in several members of the same family and not in all? And further, if it is an embryological defect why do we not see this condition in animals? In all my experience in animal laboratories for the past 35 years, I have never encountered a polycystic kidney. Of course it is possible that the reasoning is questionable. A great deal of laboratory study is still necessary to answer the question.

Prostatic Hypertrophy. When it comes to the third disease which we believe has some familial tendencies, that is hypertrophy of the prostate, we are then dealing with an hormonal problem which is definitely a pituitary, adrenal, testicular syndrome. Much research has been accomplished along these lines and a great deal is still going on. While we do not have the exact answer, the study of the prostatic cases in this series revealed that 21 per cent of the prostatic cases gave a history of the father having a similar condition while 6 per cent gave a history of both a father and one or more brothers. These percentages could very easily have been higher but in many instances, the death of the father occurred before 55 years of age as a result of some other condition.

While the treatment of these conditions is being improved, the

devastating results of the diseases in many instances are anything but pleasant. Until the etiological factors concerned in their production are known, many invalided individuals will be among us. Unfortunately where it occurs in families the damage is always greater.

In attempting to make a study of this kind it is of extreme importance to take careful histories particularly of the family history. It is quite surprising in questioning patients relative to the family history how frequently a positive answer is obtained as to whether any members of the family had a similar condition.

Of course, one might question the value of the entire study. Assuming that there are familial tendencies, what can we do about it?

It would appear to us that in a stndy of this kind if one is willing to assume that there are some family tendencies that much preventive work could be done.

Frequent examinations of the urine in individuals who give a history of calculi and frequent x-rays of the urinary tract will detect a small stone. Necessary treatment rendered immediately prevents a calculus becoming very large, producing obstruction, infection, and frequently the loss of an organ. Even that might not be the worst, but should it involve both kidneys before recognition, as it has in many cases in this series, then of course it becomes a more serious condition. Furthermore, if familial tendencies exist for the formation of calculi, children can be studied earlier and diagnoses of calculi in children can be made rather than treating them symptomatically because of no known diagnosis. Many of our cases of calculi were diagnosed in individuals between 21 and 25 years of age. Undoubtedly some of these were present many years before, because frequently histories of chills and fever were obtained and many a child was treated for intestinal conditions and in many instances removal of an appendix where a small calculus probably was the offender.

Relative to the polycystic kidney, there are few who would not agree that it is a familial disease. Many cases of polycystic degeneration succumb before they reach the age of 14 or 15. Recognizing the fact that it is a familial disease, children can be examined early and treated. It is far from correct to say that polycystic diseases cannot be relieved and their life prolonged in comfort. Even should the diagnosis be made in an adult, relief can be obtained by the various newer methods of surgical procedures. Offspring from polycystic parents can be watched and diagnoses made early before patients go into uremia. Much educational work can be done in polycystic renal disease. Advice can be given to polycystic children not to have children should they marry. That is the only way the

chain can be broken in a family of polycystics. All the children in a family where there is a polycystic parent should be examined for a similar condition.

From this study, the cases of prostatic hypertrophy have interested us considerably.

Having reached the age where the author has had an opportunity of operating upon father and son for prostatic conditions, and having observed that one or more male members of the family are subject to the same condition, the feeling is that when urinary symptoms begin in an individual with a beginning hypertrophy of the prostate where the individual has a family history of such, that some form of prostatic surgery should be performed early. Waiting until the patient becomes very uncomfortable with many urinary symptoms and with back pressure, damages the kidneys and heart with elevation of pressure. Our policy would be to perform some form of prophylactic prostatic surgery early, because most of these individuals come to surgery ultimately and then they are not in as good a condition. Many cases of prostatic cancer could probably be avoided. These operations are not dangerous, are free from disturbing sex function if properly performed and carefully selected, and much good can be accomplished.

This should not be the practice for individuals who have early prostatic symptoms without a history of a father or some other member of the family having had a similar condition.

In other words, by recognizing that familial tendencies do exist in some conditions of the urinary tract, much education can be carried out, a great deal of preventive medicine can be practiced and thereby prevent some of the devastating conditions that are encountered because of delay.

From the various research studies that we are making it is hoped that some conclusions will be reached in the near future enabling us to give some additional information relative to the familial tendencies in the production of some of these diseases.

CHEST CONDITIONS WHICH COME UNDER THE REALM OF GENERAL SURGERY

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IT would appear that more and more interest is manifest in chest conditions now that the physiology of the thoracic cavity is understood. Thoracic surgery is the newest field of surgical development; the first pneumonectomy was done in 1933. It behooves us who have not recently served our surgical residency to exploit the literature and to become "chest conscious" if we are to save lives and keep abreast of the times. Saturday night Negro brawls are not characteristic of the South only. Recently in Chicago I saw Dr. Kearns in the Cook county morgue make a post mortem examination of two chest wounds inflicted by the familiar penknife. This injury occurs in Washington and Baltimore with the same degree of frequency.

In this paper I am not going to discuss carcinoma, tuberculosis, lung abscess, bronchiectasis and those entities which belong strictly to the specialist of thoracic surgery. The material in this paper is based on representative cases of mine which were of interest to me as a general surgeon in a small town in south Mississippi.

Superficial wounds are mentioned only to say that they may be deceiving. The portal of entry may not represent the degree of underlying trauma; hence, all these wounds should be explored if there is any doubt about the extent of seriousness. Do not explore these wounds with a probe; this is dangerous. There is no harm under aseptic conditions to enlarge the opening, explore and do a primary closure after a thorough cleansing and debridement.

Figure 1 is the familiar picture of fractured ribs. Except for medicolegal records, it is not even necessary to subject the patient to the expense of a roentgenogram as the treatment is directed at pain on respiration whether the rib is fractured or not. My preference in treatment is to encircle completely the lower thoracic cavity with a three inch piece of adhesive while the patient exhales. Others prefer the intercostal block in which novocain is injected above and below the rib posterior to the site of fracture. This has the theoretical advantage of avoiding atelectasis. Early ambulation and the minimum use of opiates are also to be avoided for this same reason.

In the case of multiple rib fractures a condition may develop in which the lung collapses on inspiration. This is known as paradoxi-

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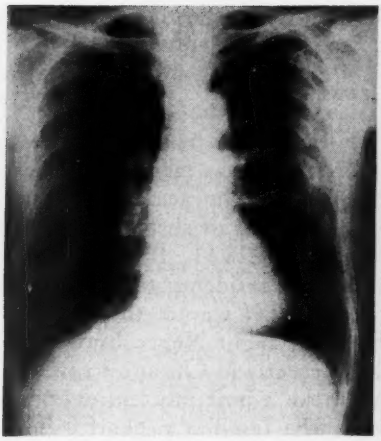

Fig. 1. Fractured rib. Fracture of 4th, 5th and 6th ribs on the left near lateral border.

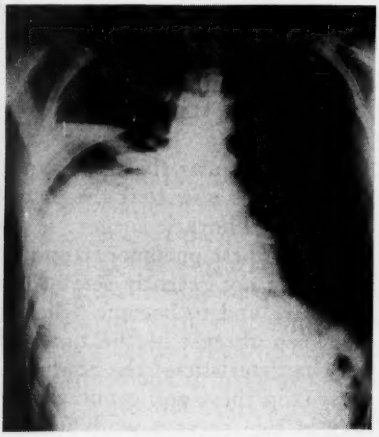

Fig. 2. *Blast Injury.* Localized areas of contusion and hemorrhage not unlike a bronchial pneumonia.

cal respiration, and this may be a rapidly fatal phenomenon. A simple treatment is to grasp the third and fifth ribs close to the sternal cartilege and suspend them with about five pounds of overhead traction.

Figure 2 illustrates the type of lesion one finds in a nonpenetrating wound of the thorax. These injuries are important because there may be considerable intrathoracic trauma with no visible external injury. The mechanism is that of increased external positive pressure plus an upswing of the diaphragm with a closed epiglottis causing increased intrathoracic pressure with injury to the alveolar tissue. This type of injury may occur after crushing automobile accidents, violent coughing, straining during childbirth, and after so-called "blast injury" from a nearby explosion. The symptoms are dyspnea, frothy expectoration, and frequently shock. The physical findings and roentgenogram are not unlike a bronchial pneumonia with localized areas of hemorrhage and contusion of the lung.

These patients are given oxygen and massive doses of atropine. Infusion should not be used as it may result in pulmonary edema. Sedatives may be used only sparingly as they diminish the cough reflex and depress respiration.

The seriousness of penetrating wounds depends on two factors: first, the size of the opening, and second, the vital capacity of the patient. A young athlete with a large vital capacity may tolerate a rent in the pleura five or six times the size of the tracheal open-

ing; whereas, in a debilitated older woman, a small rent may be rapidly fatal.

The type of injury illustrated here (fig. 3) is that of tension pneumothorax. This is due to a penetrating wound with a valvelike action in which inspired air is trapped. In the mechanism as shown the diaphragm is elevated, the lung collapsed, and the mediastinum has shifted to the opposite side causing an embarrassment to the blood entering the large vessels of the neck. This produces both respiratory and cardiac symptoms.

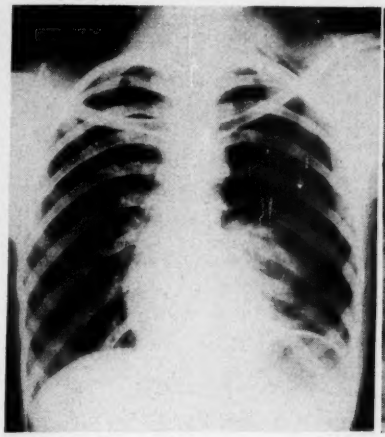

Fig. 3. Tension pneumothorax. Collapsed left lung shifting mediastinum to opposite side.

Fig. 4. Pulmonary emphysema. Air in tissue about neck. Air to left sternum.

This patient was dramatically relieved by simple aspiration. A life may be saved in this emergency by inserting a hypodermic needle into the pleural cavity, or possibly by a stab wound opening if a knife is all that is available. If air reaccumulates the needle may be attached to a rubber tubing with an underwater air trap.

The mechanism of a large "sucking wound" is immediate total collapse of the involved lung, a partial collapse of uninvolved lung and a mediastinal flutter. That is, with each respiratory effort the mediastinum shifts from side to side. The symptoms here are mainly asphyxia from lack of aereating surface and, to a lesser extent, cardiac difficulties due to constant shifting of mediastinum which interferes with normal filling of the vena cava. All nurses, attendants, and referring practitioners should be told to close the wound immediately with a pressure bandage. Suturing may be desirable after getting the patient into the hospital. If the wound is extremely large the diaphragm may be used in repair at or near the

base of the thorax; the pectoralis muscles may also be called upon if necessary. I am certain that in the past in my own hospital, patients have been lost because the physiology of penetrating wounds has not been thoroughly understood.

Pulmonary emphysema is more common after penetrating than after closed thoracic wounds. The cutaneous or surgical emphysema is merely a surgical curiosity with air traveling along the course of blood vessels. It may travel anywhere from the toes to the scalp. It resolves spontaneously. Mediastinal emphysema, however, is

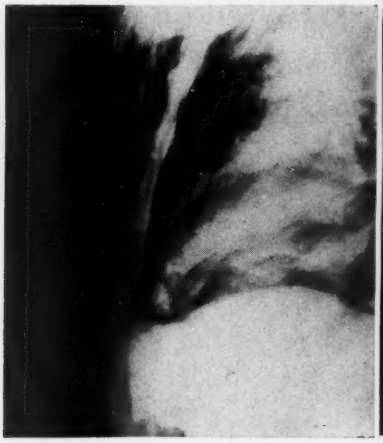

Fig. 5. Pulmonary emphysema. Lateral view shows air beneath mediastinum.

Fig. 6. Hemothorax. See clouding of entire right lung.

frequently fatal if the underlying physiology is not understood. In order for the great vessels to fill with air, the pressure in the mediastinum must be less than atmospheric pressure. If air escapes from the bronchial tree into the mediastinum the right ventricle may not get its quota of blood to aereate the lungs and the patient will die of asphyxia. The large vessels of the neck distend, there is emphysema in the suprasternal region, the venous pressure is increased, and the blood pressure drops. All these are features of the clinical picture of mediastinal emphysema.

On x-ray (fig. 4) we see cutaneous emphysema. There is air along the left side of the sternum and on the lateral view (fig. 5) one can see air underneath the sternum. Aspiration with a needle to left of the sternum and directed under the sternum may give relief. This failing, do not hesitate to do a collar incision as in doing a thyroidectomy, and invade the superior mediastinum. As a last resort a trachectomy may be indicated. This patient whose

chest was illustrated on the lantern slide required a suprasternal incision to prevent a fatality.

Figure 6 is a young Negro with a hemothorax as a result of a stab wound. He had no respiratory symptoms, but he showed signs of hemorrhage which is characteristic of this lesion. The mechanism of hemorrhage into the thoracic cavity is different from hemorrhage into other places due to heart and respiratory action: the blood becomes defibrinated which makes aspiration simpler. The fibrinous exudate collects on the pleura after causing a constricting band

Fig. 7. Empyema. See drain in place. No re-expansion of lung, however, even though adequately drained.

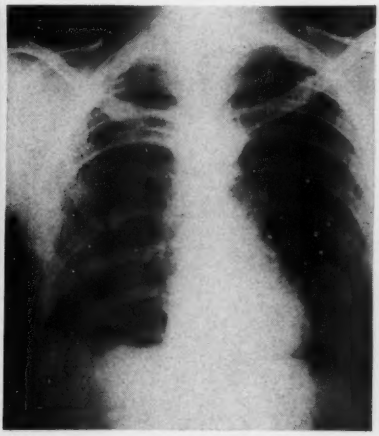

Fig. 8. Decorticated lung. End result after Figure 7, lung decorticated.

which may keep the lung from re-expanding. The treatment of hemothorax is controversial. Fortunately, most hemorrhages of the lung stop spontaneously because the pulmonic pressure is only about one-sixth the systemic pressure. Since this is true, there are some who would not aspirate unless respiration is embarrassed, and then only enough to stop the bleeding. I belong to the group who aspirate and replace with an equivalent amount of air. This I believe is a more accurate way of determining blood loss as it maintains the pressure needed to arrest hemorrhage. If hemorrhage continues, a systematic search must be made. If the wound is near the sternum, the internal mammary artery may be severed. If an intercostal vessel is suspected it is best to resect a portion of the rib as the vessel usually is found beneath and on the posterior surface of the rib. If a thoracotomy is necessary, cyclopropane as a positive pressure anesthesia is a prerequisite. Any lacerated, bleeding lung tissue may be sutured.

If the lung fails to expand within three to six weeks, a decortication is in order. Dr. Sanger, who popularized the decortication procedure, now operates as early as 10 to 12 days after injury. Since this is a new procedure, I will outline briefly his technic. He makes a posterior lateral incision to resect the seventh rib. The lung is found encased with a thick gristle-like membrane, and in an old case has to be removed completely from the visceral surface. The wound is sutured using closed drainage.

Figure 7 shows that even though first closed drainage and then

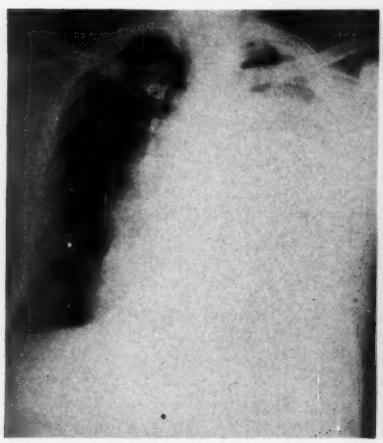

Fig. 9. Extra pleural hemorrhage. Roentgenologist reported hemothorax on left.

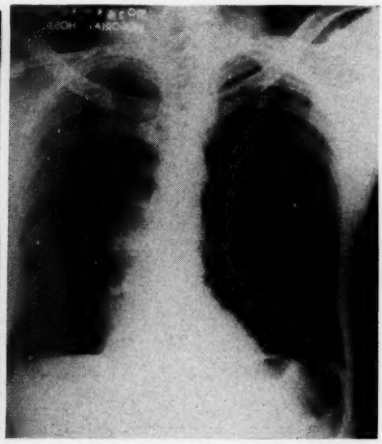

Fig. 10. Multiple wound. Tension pneumothorax on left. See partial collapsed lung. This patient also had abdominal wound.

adequate open drainage was used on this patient the lung still failed to re-expand. Figure 8 shows the end result after decortication.

Figure 9 is that of a Negro who, while doing heavy lifting, had a pain in his left chest. The patient had marked dyspnea and had to be propped up in bed. He developed signs of hemorrhage, and the roentgenologist reported a hemothorax. All signs substantiated the x-ray findings, except that anteriorly the chest seemed hyperresonant. Autopsy revealed a large posterior extrapleural hemorrhage from a ruptured aneurysm which filled most of the left side of the thoracic cavity.

Much to my surprise, I was unable to find a recent case of empyema. The new biochemicals and antibiotics have made this entity almost extinct. Already by early closed drainage and later adequate open drainage, the mortality had been greatly reduced. The more formidable procedures such as muscle transplant or thorocoplasty

for treating chronic empyema have now been replaced by the decortication operation.

Figure 10 shows a patient who was stabbed twice with an ice pick. Tension pneumothorax with collapse of the lung was the result of the first wound. The second wound was inflicted through the right leaf of the diaphragm into the abdominal cavity. This injury occurred late at night and the surgeon who called me on consultation already had the patient in the operating room to explore the abdomen. Because the injury was on the right side the operation was

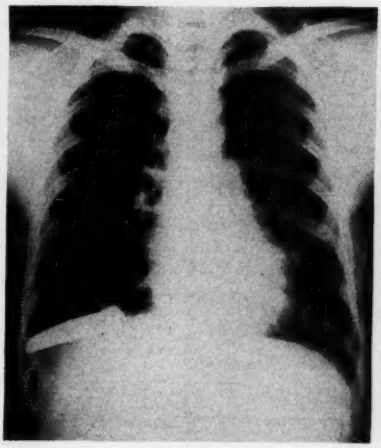

Fig. 11. Foreign body lung. On right see automobile door handle in right pleural cavity.

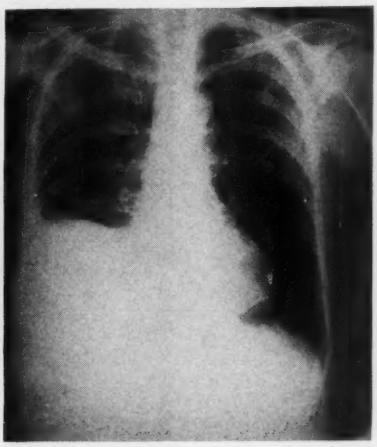

Fig. 12. Subphrenic abscess. Elevation of diaphragm on right obliteration right costophrenic angle.

cancelled. On the right side the liver is the organ usually damaged and we know that now many liver biopsies are done with a relative degree of safety. The danger of a traumatic diaphragmatic hernia later is nil because the liver plugs the hole. Had this injury perforated the left leaf of the diaphragm surgery would have been indicated because of the possibility of a wound of the transverse colon, which, if not closed soon, gives a high mortality. This type of wound gives relatively no early symptoms.

This case (fig. 11) tends to discredit the statement that all objects over one centimeter should be removed immediately. The foreign body you see in this pleural cavity is a metal automobile door handle. The patient had a sucking chest wound. On admission the nurses tried frantically to recruit a doctor but did nothing about closing the wound with a dressing. The closure of the wound was a lifesaving operation. In these early days I did not aspirate,

but allowed blood to accumulate in the pleural cavity. The patient was x-rayed and fluoroscoped, but the hemorrhage hid the foreign body. This boy won the lightweight boxing championship in high school with this large piece of metal in his chest. It was discovered some years later by a routine chest x-ray. An emergency thoracotomy in such an instance is mandatory only because of complications. If removal of a foreign body is necessary it may be done at a later date under optimum conditions.

Figure 12 shows a condition in which the primary involvement is

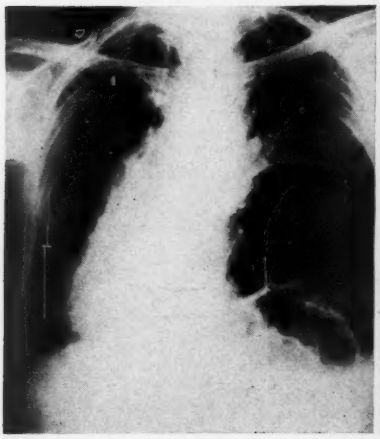

Fig. 13. Eventration of diaphragm. Elevation of diaphragm on left with abdominal contents displacing diaphragm upward and shifting mediastinum to opposite side.

Fig. 14. Pulmonary enfarct. Triangular area of increased density of right costophrenic angle.

below the diaphragm and the pleural cavity is secondarily involved. This woman had a gallbladder removed with an uneventful recovery. She was discharged home but returned three weeks later with fever, a hacking cough, and a dull aching pain in the right side of the chest. On x-ray the diaphragm is elevated, the lateral costophrenic angle is obliterated, probably indicating pleural fluid. On fluroscopic examination, the diaphragm is fixed. This patient was cured by draining the abscess by posterior approach and resecting the twelfth rib as advocated by Dr. Oschner. This condition if kept in mind and operated on early cuts down tremendously the mortality rate.

While talking about diaphragms, figure 13 is an interesting illustration. It is a case of eventration of the diaphragm, due to weakness of the phrenic muscles. Here we see a marked elevation of the diaphragm and a displacement of the mediastinal structures to the

opposite side. The diaphragm moved with respiration. This man had a sacroiliac condition which was an incidental finding.

Pulmonary embolism (fig. 14) is another late complication of surgery manifest in the chest. This patient had a herniotomy under local anesthesia; he was ambulatory since the operative day and was discharged on the fifth postoperative day. He developed a thrombophlebitis and a subsequent pulmonary infarction on the twenty-third day postoperatively. This lesion does not describe the typical triangle seen in textbooks but with the history and lesions usually found in periphery, I feel certain of my diagnosis. Anticoagulant therapy, or ligation, or both, are too controversial to argue about here.

Fig. 15. Atelectasis. Atelectasis left lung. Shifting of mediastinum toward affected side.

This last case (fig. 15) is one of atelectasis which usually comes on shortly after operation. This one followed a fractured leg of a boy put up in balanced traction. He had received no anesthesia. I have recently had a case of atelectasis in a patient who had a hernioplasty. He had no preanesthetic drug and was done under local anesthesia. He walked on the day of operation. The mechanism is a plugging of a bronchus and on x-ray we see, contrary to other chest conditions, a shifting of the mediastinum to the affected side. This condition can not be prevented entirely, but choice anesthesia, a minimum of sedation, the use of scopolamine instead of atropine, early ambulation, and waking the patient to cough periodically probably cuts down on the incidence of atelectasis. This chest condition clears up spontaneously as rapidly as it occurs. Frequently bronchoscopic aspiration has to be used.

In summary, the object of this paper is to call attention to the many different things that can happen to a chest. By reviewing these entities the general surgeon will probably make fewer mistakes of omission.

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RADICAL BREAST SURGERY AND LOCAL RECURRENCE

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BEFORE going into the body of this paper I want to say that I am acutely aware of the difficulty of comparing the results of various clinics. No two clinics do exactly the same type of radical surgery, and furthermore, I feel certain from observation in our own clinic that we have no uniform technic. Also, it is to be deplored that we have not a League of Nations standards and rules for breast surgery, so that we could be talking a common language when the case reports are made. This would apply to the surgical procedure, the standards of operability, and thirdly the method of reporting the results.

In reporting the results of treatment of cancer of the breast, it would be well to state, first, the number of cases that apply for treatment; second, the number of cases that are refused operation; third, the number that are subjected to radical surgery; fourth, the number that have had local recurrence within five years; and, fifth, the number that are free of evidence of the disease at the end of five years. It is rare to see any statement as to the number of applicants and the number refused operation.

We next come to a record of the cases that were lost to the follow-up. Shall we count them all dead; shall we exclude them from our list; shall we ask a statistician to estimate how many of them would be dead? Likewise there is also the very important group, THOSE DEAD OF SO-CALLED INTERCURRENT DISEASE. Even McWhirter,[1] who makes a report on 1,451 cases, *not one of whom was untraced,* has a large group of patients dead of intercurrent disease. In my opinion, IT JUST DOES NOT MAKE SENSE to exclude these cases. I am convinced that the so-called improvement in results in many clinics is due to the more liberal use of this last factor.

Since the time of Moore[2] of Middlesex Hospital of London, in 1867, the surgery of cancer of the breast has made a complete cycle: (1) Local excision, (2) Simple mastectomy, (3) Radical mastectomy, (4) Simple mastectomy, (5) Local excision, the two last with x-ray treatment given postoperatively.

I shall try to discuss the significance of this cycle and explain the reasons.

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Moore said that cancer at the start was a local disease. To him local excision seemed to be sufficient. He had no cures. Simple mastectomy (that is, wider removal) seemed to offer more hope. With this procedure the late H. B. Sands of New York, in the 1880's, had no three year cures. Then one of Sand's assistants, Halsted,[3] became convinced that even more widespread removal was necessary. So in 1894 he introduced his now famous radical mastectomy including dissection of the supraclavicular nodes. With this technic results were so superior that a profound and lasting impression was made on the surgical world. In essence, his basic operation has persisted to date. It is true that there have been modifications, even by Halsted himself, who abandoned the supraclavicular node dissection, as well as the incision down the arm. Sampson Handley also induced many to follow some other modifications.

As time went on, thoughtful surgeons became dissatisfied with the results of the radical mastectomy, so that roentgen therapy or radium was added to the surgical procedure, either before or after operation.

Some believed that results were so much better with roentgen therapy that radical operations were not necessary or even harmful. This is exemplified today by McWhirter of Edinburgh, who has abandoned radical mastectomy for simple mastectomy, followed by roentgen therapy; and Keynes[13] of London, who this year was content with local excision, followed by roentgen therapy. The cycle is now complete. We are back to the surgery of 1867 with an added placebo of roentgen therapy.

This generation was brought up on the idea that radical mastectomy for cancer of the breast is best and necessary. Yet many of us have been unhappy with our results. WHAT MORE SHOULD WE DO?

One of our great difficulties is that at this late date we still confuse fact and theory. Strange as it may seem, this is in part due to our lack of knowledge of the physiological pathology of this disease.

For example: How does localized cancer of the breast spread? By infiltration, embolism or permeation in the lymph channels? Does it spread by the blood stream? It is now thought to spread by all four methods. It was once generally believed that carcinoma of the breast never spread by the blood stream. It has been necessary to modify this, for in no other way may certain distant metastases be explained. However, it is a very small percentage factor.

The spread by infiltration is easy to comprehend. This indicated the decision to go wide of the tumor and remove the overlying skin. Halsted said he removed a wide area of skin. How much is wide?

Is Sampson Hanley's minimum diameter of 5 inches enough? Is that enough to go beyond the infiltration?

When we come to the cancer spread by embolism and by permeation we enter a foggy field. Many authorities have discussed with heat and sometimes light the pathology of the spread of cancer by permeation and the method to overcome it. One authority says the spread is just beneath the cutis, therefore make a peripheral dissection so as to leave a drumlike appearance to the skin. Another authority says the spread is along the deep subcutaneous layer, therefore leave fat and blood supply attached to the skin. To be honest, we do not know who is correct. Moreover, there is plenty of information to show that with each of these methods of approach there has been about an equal percentage of local recurrence.

While I have followed Handley's theory of spread by deep layer, I am not unconscious of the fact that he may be wrong. By the same token, I believe the school of procedure that advocates extremely close dissection should abandon this method and really cut a much larger area of skin instead, in order to be logical.

It has been accepted as a fact that breast cancer fairly early metastasizes by embolism to the adjacent axillary nodes. We do not know if this is so, or if it is really by permeation through the lymphatics. If it is by permeation it would help to explain the local recurrence or persistence of the disease.

I have the belief that cancer, at the same time that it goes to the axilla, also frequently spreads by the lymphatics around the chest wall into the pleura, or into the mediastinum. This is supported by Handley and Thackray.[5] In 50 consecutive cases of carcinoma of the breast, they were able to demonstrate involvement of internal mammary nodes, when there was no axillary node involvement and in other cases, simultaneous involvement of the axillary and internal mammary nodes. As they remark, the cases were no longer stage I or stage II, they were stage III.

If this is so, are we not often operating upon incurable cases, when we believe that we are working on a purely localized cancer? For example, the most enthusiastic surgeon, Adair,[6] announces in reverse that 16 per cent of his localized cancer cases die of cancer (only he never puts it that way). Because of our belief in the spread of cancer, we have questioned the type of surgery that meticulously carries dissection out into the periphery. In my opinion, if cancer has reached that area, the patient is doomed. By the same reasoning, in doing a radical mastectomy, the entire tissues should be removed in one block. Any other method most likely cuts across cancerous lymph channels.

In reference to our belief in extension of the disease to other areas than the axilla, at the same time that the axillary nodes are involved, we would like to record that in a study of the first known site of recurrence in 119 Roosevelt Hospital cases,[12] 60 per cent were outside of the operative field.

McWhirter[1] of Edinburgh, in a recent article, has shown the trend of thought that has induced him to abandon radical surgery, to return to simple mastectomy, followed by postoperative roentgen therapy. McWhirter has felt that in the hands of the surgeons at the Royal Infirmary, the results of the radical mastectomy were inadequate. He states that all the Royal Infirmary surgeons agreed that when the disease was local, the results were excellent, but when the axillary nodes were involved radical mastectomy often failed to save the life of the patient. "This led to the belief that dissection of the axilla might cause dissemination of malignant cells to sites beyond the area to be irradiated."

This is an opinion and not a fact. By the same token, it is my opinion (but more probably a fact), that pressure on the axillary nodes during dissection does not disseminate the cancer to the mediastinum, spine, other breast and axilla. More likely, the cancer is already, in this type of case, en route to the areas outside of this irradiated area.

Let us admit frankly that the results in radical surgery are not good when the axillary nodes are involved. The reports vary between 20 and 47 per cent five years' survival. Do you think that simple mastectomy followed by x-ray of 3750 R. Units (such as McWhirter uses) will give better results?

The work of Adair and Quimby[7] in the use of preoperative roentgen therapy on 117 patients is relevant to this discussion. They first noted a reduction in the size of the primary tumor and secondly a lesser reduction of the axillary nodes. All 117 patients subsequently underwent operation. In only 8 per cent (3 out of 39) of 39 cases with clinical axillary involvement did the pathological examination fail to demonstrate carcinoma.

Even McWhirter[1] is not too certain in his mind, for he says, "If the patient is stout, it is better to carry out a radical mastectomy, because in such patients it is difficult to deliver an adequate dose of roentgen ray to the axilla."

In recent years I have been intrigued by the subject of local recurrence, by local is meant that, in the operative field. The most common form is one that appears as a small nodule in the skin, perhaps slightly pink in color. There may be several located along the border of the healed wound. These would suggest that not enough skin has

been removed. Another form appears first as subcutaneous masses in the parasternal region. These I believe to be probably retrograde from involved internal mammary lymphatics. Another form is seen more lateral, but not so commonly. These are probably from implants at the time of the operation.

Some surgeons believe that since the introduction of postoperative roentgen therapy, the incidence of local recurrence has been reduced. This has not been confirmed by us.

In an analysis of 238 cases at the Roosevelt Hospital that were followed five years and longer, we found local recurrence in 54 cases, some of which did not appear until after 10 years. This made a local recurrence rate of 22.6 per cent. But when we broke down our cases into the group that had localized cancer and the group with axillary metastases, we found that in the former there was 11 per cent local recurrence, and in the latter 31 per cent.

At Roosevelt Hospital we have tended to follow the teachings of Sampson Handley, in so far as we have taken a minimum radius of two and one-half inches of skin and then dissected in a peripheral manner in all directions. Usually we have been able to close the skin edges. It has not been our practice to do routine immediate skin graft, although naturally we must do so, if the breast is small, or when we have been forced to take out a much greater amount of skin.

With this rate of local recurrence, we decided to check our results with others. First we found the "cupboard bare," when it came to a statement of the amount of skin removed, and by that I mean the measurements reported by the pathologist. At any rate, we found some records with which we could compare. If we use only cases of localized cancer, the local recurrence rate was about the same in either case. With plastic closure we had a local recurrence rate of 10.8 per cent. Presbyterian Hospital[8] in New York City, with routine skin graft, had a local recurrence of 9.8 per cent.

I have referred to the fact that, in a sense, local recurrence is a reflection on the surgeon. He admits this, and tries to improve his results in three ways: first, he performs a more radical and careful operation—skin, subcuticular dissection, etc., etc.; second, he demonstrates his skill by working with an enthusiastic pathologist, whose thoroughness and carefulness reduces the number of cases of localized cancer, so that in this group we have even a lower percentage of local recurrence. A recent report of Saphir[9] has called our attention anew to this phase. Third, he screens out a large group of patients as inoperable. Let us grant that he is on sound grounds in most instances, and for a major part, we are in agreement. Never-

theless, in an effort to avoid needless surgery or to improve his records, he runs the risk "that some lives may be lost that otherwise might be saved" (McWhirter[1]). In our experience we can mention, as example, two such patients, who have lived for many years after operation, one that had the radical operation while six months pregnant, and going on to term; and another with a foul cancerous ulcer that required a two stage operation to minimize infection. Both of these are on most lists of inoperability. All of the above methods of approach, some negative and some positive, have merit. I am inclined to believe, however, that the radical surgeon has gone about as far as he can go in cutting.

Today I wish to call to your attention a fourth factor, which I had ignored until I had a mishap. After performing a radical mastectomy, I had occasion to do an immediate skin graft from the left thigh. As far as I was aware of it, I had been wide of the gross growth in my dissection, although I had recognized some axillary metastases. Then, without changing my gloves, I went down and took off the superficial skin with a dermatome. To my chagrin, the patient later grew adenocarcinoma on the donor site.

Walter Brandes,[10] pathologist of the Roosevelt Hospital, then became interested. He found that Ryall[11] in 1907 pointed out that local recurrence was frequently due to contamination of the instruments used in operation, with the cells from the tumor being removed. He concluded that it was "therefore of the utmost importance to guard against the danger of implanting these cells into any fresh wound." In 1908, he recommended a complete change of gloves, drapes and instruments, and repreparation of the operative site, after biopsy of a malignant tumor had been made and the exploratory incision closed. Such was our procedure at the time of my mishap.

Brandes then went further to study the washings of the knives, artery clamps and gloves used in the radical operation, with very frequent findings of viable cancer cells. The gloves must have been the transferring agent in my skin graft case.

To repeat, I believe that a fourth and very important way in the effort to reduce the percentage of local recurrence is the meticulous effort to avoid the cancer at operation. I like to compare this to an effort to excise an abscess under as sterile precautions as possible. In each instance we run the chance of cutting across lymph channels full of cancer cells or bacteria, with secondary deposit on the gloves and the instruments.

It is granted that this fourth way is difficult to perform. We can

make some changes, to minimize the dangers of contact with severed cancer channels. We never use an artery clamp the second time. Change gloves and knives often, followed by thorough flushing of the wound at the end of the operation to wash out loose cancer cells.

A fifth way is in the taking of a biopsy. In the past the lateral Warren incision has often been used as a method of approach, especially when a diagnosis of a cystic mastitis was made. Its cosmetic value is appealing. In view of what I have just said, there is grave danger of the spread of cancer cells in the raw wound, so I believe that this incision should be abandoned. By preference, make the biopsy approach directly over the site of the tumor, and then seal off this area with glue and rubber pad, to prevent the escape of blood and cancer cells on to the area that is then prepared anew for the further procedure.

To recapitulate: Local recurrence is a measure of the surgical procedure. To reduce the percentage of the local recurrence, we must have: (1) More careful technic in the biopsy of the tumor, (2) More careful tumor asepsis, (3) Radical removal in one block.

If our pathologist is enthusiastic and competent we will have a lower percentage of local recurrence in localized cancer; perhaps more in the remainder. Success with the latter group is proportionate to the number of cases that are refused operation.

Finally, I wish to make one more remark. Cancer of the breast is curious in its behavior. A favorable case turns out badly, an unfavorable case turns out well. If this is so, we are often justified in operating.

After all, although the results are often poor, surgery gives the only chance of cure. In our experience, roentgen ray should never be a substitute. After all, it is only a palliative.

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EXPERIENCES IN THE SURGICAL TREATMENT OF CONGENITAL PULMONARY STENOSIS*

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PRIOR to 1945 cyanotic infants and children with congenital heart disease were considered hopeless. Supportive measures such as the administration of oxygen and the use of digitalis for cardiac failure were resorted to by pediatricians in an effort to prolong life. Only a few pediatricians and practically no surgeons were actively interested in the problems of the cyanotic child.

The brilliant operation devised by Drs. Blalock and Taussig[1] in 1945 for patients with pulmonary stenosis or atresia awakened widespread interest in these malformations. The operation consists of the construction of an anastomosis between the pulmonary artery and one of the systemic arteries arising from the aorta. This artificially created ductus serves to shunt needed unaerated blood to the lungs by way of the aorta.

Originally Blalock performed an anastomosis between the left subclavian artery, arising from the aorta, and the left pulmonary artery, but now, in instances of left aortic arch, which are in the majority, he prefers to enter the right chest and anastomose the right subclavian, arising from the innominate, to the pulmonary artery.[2]

Potts' very clever modification[3] employs a shunt between the aorta itself and the pulmonary artery. This is possible by the use of an aortic clamp which permits the creation of a direct aortic-pulmonary anastomosis without complete occlusion of the aorta.

It is evident that there are differences of opinion regarding several features of the operation. The question of which side of the chest to enter has produced considerable discussion. The decision of whether to use the Blalock or Potts type of procedure is an important one. For these reasons we wish to report our experiences and impressions acquired during the surgical treatment of a limited series of 20 patients with the tetralogy of Fallot and related conditions. The oldest patient in this series was 18 years and the youngest was 3 months. Only 2 children were under 2 years of age.

An anastomosis was performed between the systemic and pulmonary vessels in 17 of the 20 cases. Of the 3 cases in which anas-

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tomosis was not carried out only 1 ended fatally. This patient was an 8 months old infant weighing 8 pounds. Before operation it was necessary to keep her constantly in an incubator. Deprivation of the high oxygen atmosphere for even a few minutes produced severe dyspnea. The infant was considered a very poor risk but a Potts operation was contemplated. Through a left posterolateral incision an adequate left pulmonary artery was mobilized. It became necessary to ventilate the left lung frequently since collapse invariably produced cardiac irregularities. The infant died during dissection of the aorta. Autopsy revealed that no pulmonary artery existed on the right side. A second child, two and one-half years of age, was intensely cyanotic with an arterial oxygen saturation of 38 per cent. The clinical picture was atypical, but in view of the child's condition it was decided to give him the benefit of an exploration. At operation, the left pulmonary artery pulsated forcefully and when a pressure reading was taken with a water manometer capable of registering 600 mm. the fluid was rapidly forced through the top of the gauge. It was obvious that the condition was not one of inadequate blood flow to the lungs and no anastomosis was performed. The patient recovered satisfactorily from the thoracotomy. The third patient was an 11 year old boy with atypical clinical findings. At operation a 2 cm. pulmonary artery with vigorous pulsations was found in the left chest. When an attempt was made to measure the pressure in the pulmonary artery the water in the manometer spurted from the top of a 600 mm. instrument. It was assumed that the case was probably a truncus arteriosus. The postoperative convalescence was stormy for four days but the patient ultimately recovered.

In 17 cases an anastomosis was completed. Fifteen of the patients have shown improvement from good to excellent and two have died. The first death occurred in a four year old boy 17 hours postoperatively. Anastomosis was performed between the left subclavian artery and the left pulmonary artery. No unusual difficulty was experienced with the operation and a satisfactory thrill was noted in the pulmonary artery after release of the clamps. A moderate cyanosis which was present during the procedure, however, was not relieved at the completion of the operation. The patient reacted from the anesthetic, took fluids by mouth, talked and showed no evidence of weakness of the extremities. Increasing cyanosis and hyperexia were followed by death. Autopsy revealed a patent anastomosis, extreme dextroposition of the aorta, hemorrhage into both adrenal glands and negative findings in the brain. Anoxia was considered the cause of death.

The second death occurred in a three year old child with whom considerable trouble was experienced in locating a pulmonary artery.

Finally deep in the hilus of the lung a 4 mm. vessel was found which registered a pressure of 400 mm. of water. An anastomosis was constructed with a small subclavian artery even though we were skeptical of any benefits because of the pressure in the pulmonary artery and the small size of the vessels involved. Cyanosis was not relieved by the anastomosis and cardiac standstill occurred during closure of the chest. Cardiac massage and intracardiac procaine did not revive heart action. Unfortunately, permission for autopsy was not granted.

With one exception all cases were in the general group of tetralogy of Fallot. The exception was a three months old infant with tricuspid atresia. There were no cardiac murmurs and cyanosis was extreme and progressive. When the infant was admitted to the hospital the condition had deteriorated so that oxygen was necessary constantly. The aorta arched to the left and a Potts procedure

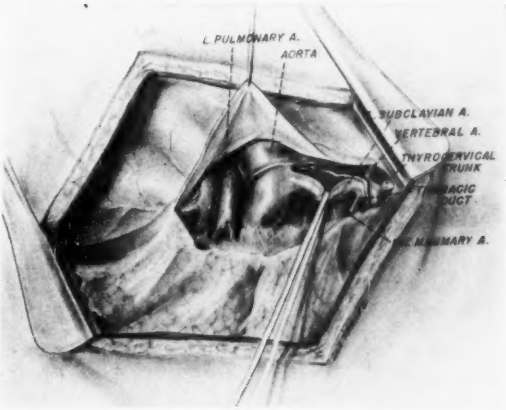

Fig. 1. Relationship between thoracic duct and left subclavian artery.

was carried out. The patient tolerated surgery well and was permitted to return home 10 days after operation with an excellent result.

Neither the common carotid artery nor the innominate artery were employed in any case for the construction of a shunt.

No end-to-end anastomoses were performed. The subclavian artery was joined to the pulmonary artery in sixteen instances as an end-to-side anastomosis. In only one case was the approach through the right chest.

One of the most distressing postoperative complications occurred in a 12 year old girl (fig. 1). Through a left-sided approach the

aortic arch was found to be high in the chest and there was a considerable distance between the origin of the subclavian artery and the pulmonary artery. A short left subclavian artery further complicated matters. Extensive dissection was carried out to free the arch of the aorta and the subclavian artery. It was necessary to extend the dissection beyond the primary branching of the subclavian artery in order to procure a suitable length of vessel for anastomosis. An end-to-side shunt was secured and a satisfactory thrill was noted at the conclusion of the procedure. The pleural cavity was dry when chest closure was affected. The postoperative course was uneventful until the twelfth day when a massive chylothorax was discovered in the left chest. A thoracentesis had to be done every 48 hours to relieve dyspnea, approximately 2000 cc. of chylous fluid being removed each time. Thirty days after operation there was no evidence to indicate a decrease in the accumulation of chyle in the left pleural cavity and total blood proteins were reaching a dangerous level in spite of intensive plasma administration. It was decided at the time that it would be hazardous to wait longer, so a second operation was performed at a lower level through a posterolateral incision with removal of a portion of the sixth rib. The thoracic duct which measured only 1 mm. in diameter was identified and triply ligated. There was no further collection of chyle after this operation, and the patient, when last seen one year after operation, had good color and stated that she had been picking cotton in the fields without any ill effects. It is believed that the portion of the thoracic duct injured was that which crosses the subclavian artery high in the chest.

It has not been emphasized previously that the duct courses upward medial to and behind the left subclavian artery, and crosses the artery in the region of its branching, before emptying into the great veins in the left side of the neck. Since this accident occurred the thoracic duct has been visualized as it crosses the artery and pushed aside in two other cases in which high subclavian ligation was necessary. Recently Holman[4] and Paine[5] have reported complications of chylothorax following dissection of the left subclavian artery.

Pleural effusion has not been an important complication. Only 2 cases required thoracentesis. A certain amount of effusion was present in most cases for a few days but no special treatment was required. No patient developed pneumonia or empyema, but it has been customary to begin penicillin two days before and continue it for one week after operation.

One patient developed a massive hemorrhage in the left chest 12 hours after operation. A left end-to-side subclavian pulmonary

artery anastomosis had been created and no bleeding was encountered after removal of the clamps. A moderate number of small collateral vessels were present about the hilus of the lung but they had caused no unusual trouble during operation. Two pressure readings had been taken from the pulmonary artery. Approximately 3000 cc. of blood was later aspirated from the left chest over a period of two hours and the same amount replaced. Eventually the bleeding ceased without necessitating thoracotomy. The anastomosis is intact as shown by the presence of a continuous murmur and satisfactory improvement in the patient's condition. We have considered that bleeding originated from the needle puncture wounds in the pulmonary artery, the collateral vessels about the lung or the wound in the chest wall itself.

Tracheotomy was necessary in 1 case as a result of laryngeal edema. We have attempted to avoid this complication by the use of small size endotracheal tubes without cuffs.

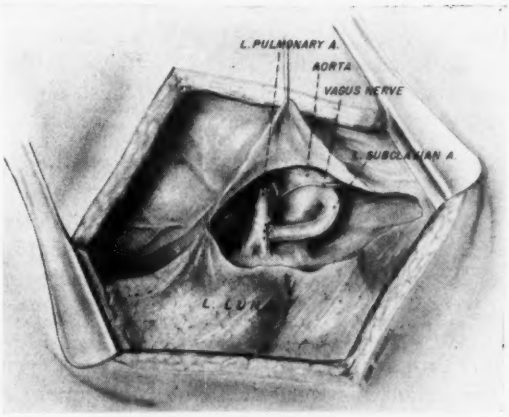

Fig. 2. The Blalock operation—anastomosis between the left subclavian artery and the left pulmonary artery.

With the exception of one instance, all operative approaches have been through the left chest (fig. 2). Originally the incision was made in the third interspace but more recently the second interspace has been utilized with division of the second and third costal cartilages. This provides more ready access to the subclavian artery. In girls a curved incision is made below the breast with reflection of the breast upward, this cosmetically is more satisfactory.

The first 7 cases operated upon were approached through the left chest. Results were excellent in these cases with no mortality. Since Blalock had recommended that the anastomosis be performed on the side opposite to that of the descending aorta, we decided to

enter the right side of the chest in our next case, one with a left arch. During the operation it was obvious to us that dissection of the pulmonary artery on the right side was more difficult since the available vessel was shorter and its branches relatively longer. The subclavian artery arising from the innominate proved to be very short also even though division was carried as high in the chest as possible. Considerable tension was necessary to approximate the subclavian artery to the pulmonary artery during which maneuver the bulldog clamp slipped off the subclavian artery. Fortunately temporary ligatures had been previously placed about the innominate and carotid arteries and the subclavian was secured after only a moderate blood loss. The anastomosis was completed after considerable difficulty and the patient has shown a very satisfactory response to the operation.

This experience in April, 1948, led us to consider that the left-sided approach was more suitable, at least in our hands, and the remainder of our cases have been operated upon through the left chest irrespective of the side on which the aorta descends. Paine,[5] Holman[4] and Lam[6] have each reported similar difficulties with subclavian pulmonary anastomosis in the right chest and they have expressed a preference for operation in the left chest.

We believe that one can enter the left side of the chest, in most cases, with a good prospect of completing some type of anastomosis. In older children with right aortic arches, anastomosis of the left subclavian artery, which arises from the innominate, to the left pulmonary artery is one of the most satisfactory procedures. This is due to the increased mobility afforded the subclavian by the innominate artery. In cases of left aortic arch, in all ages, one has the choice of either a Blalock or Potts operation. It has been our custom to measure the distance between the point of origin of the subclavian artery on the aorta, and the site for anastomosis on the pulmonary artery. By then measuring the available subclavian artery one can determine, with a fair degree of accuracy, whether the subclavian artery can bridge the gap without undue angulation. Ordinarily a discrepancy of over one and one-half cm. suggests that kinking can be expected.

When a short subclavian artery is present, or a normal subclavian artery arises from a high aortic arch, or the subclavian is small; in other words, when it is doubtful that a subclavian-pulmonary artery anastomosis can be satisfactorily performed, then we believe that the Potts procedure should be carried out. It is better to make this decision before the subclavian artery is divided and the pulmonary artery prepared for anastomosis, since a Potts type of anastomosis

might be difficult to execute with a previously opened pulmonary artery. The Potts operation can be done quite readily through the anterior approach (fig. 3). Extension of the anterior chest incision around the shoulder girdle after the subclavian artery has been divided might result in gangrene of the arm due to sacrifice of an excessive number of collateral vessels.[6]

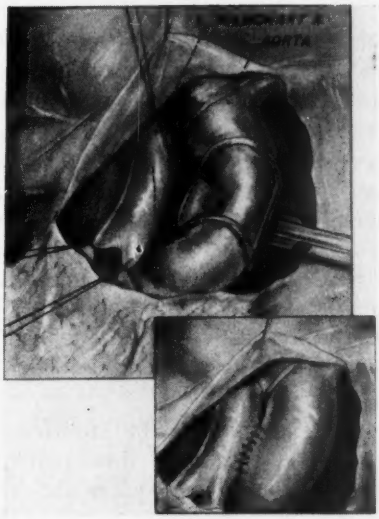

Fig. 3. The Potts operation—side-to-side anastomosis between the aorta and left pulmonary artery.

After the construction of an end-to-side left subclavian-pulmonary artery anastomosis, if there is undue angulation of the subclavian artery, one may attempt to decrease this by mobilization of the aortic arch or division of the pulmonary ligament. Should these additional procedures fail then one can divide the left pulmonary artery proximal to the anastomosis and permit the pulmonary artery to rise in the chest. This measure recently suggested by Holman[4] produces, in effect, an end-to-end anastomosis. Such circulation is certainly preferable to an inadequate circulation to both lungs.

One of our cases has shown only moderate improvement following left subclavian-pulmonary artery anastomosis.* The remainder of the surviving patients have had results which might be considered very satisfactory. In this patient a short left subclavian artery was anastomosed to the side of the pulmonary artery with the result that

*Addendum: An anastomosis has since been performed in the right chest with an excellent result.

an acute angulation was present at the origin of the subclavian artery and only a faint thrill was noted over the anastomotic site. A continuous murmur is not present in this case although undoubtedly some blood is going through the anastomosis since the patient has shown improvement. A moderate degree of cyanosis still exists. It would have been better in this case if the left pulmonary artery had been divided proximal to the anastomosis.

In instances where the left pulmonary artery is of small caliber, an end-to-end subclavian-pulmonary artery anastomosis might be preferable to either an end-to-side subclavian-pulmonary artery or Potts anastomosis.

In small infants with a right aortic arch one is confronted with an important problem. The possibility of finding a subclavian artery of sufficient caliber on either side is somewhat remote. The Potts operation is more difficult to perform in the right chest because of wider separation between the aorta and pulmonary artery. The decision of which side of the chest to enter must be guided by the size of the child and other factors. An infant with a left aortic arch should, in our opinion, be considered a candidate for a Potts operation.

Blalock's technic of performing the anastomosis has been followed with very few deviations. If dissection of the pulmonary artery is begun in the proper cleavage plane one can usually mobilize the vessel quite readily. It is important to isolate the left pulmonary artery from its origin to just beyond the main branches in order to have an adequate length of vessel between clamps. There is practically always an abundance of small collateral vessels about the hilus of the lung and occasionally annoying bleeding is encountered during the dissection. Ligation of these small vessels greatly facilitates the procedure.

Careful removal of a wide cuff of adventitia from the divided end of the systemic artery is important. Attention to this detail prevents strands of tissue from being carried into the lumen of the artery by the needle during suturing. Due to the thinness of the pulmonary artery one should not remove as much of the adventitious tissue.

A transverse incision in the pulmonary artery is best made closer to the branches than the origin of the artery. This tends to minimize kinking of the subclavian artery by swinging it outward slightly. It is our practice to make the transverse opening in the pulmonary artery smaller than the lumen of the systemic artery since manipulation of the open vessels while suturing has a tendency to increase the size of the opening in the pulmonary artery. If nec-

essary, the lumen of the pulmonary artery can be enlarged readily with scissors after the suturing of the posterior wall has been completed.

A continuous everting suture of 00000 arterial Deknatel is placed in the posterior wall of the anastomosis and then pulled up snugly. Interrupted sutures at either end complete the closure of the posterior wall. Traction upon these two sutures while the anterior row is being placed will satisfactorily prevent constriction of the stoma.

The anastomotic stoma will probably enlarge in most cases as the child grows and the body needs for oxygenated blood increase. Recent work[7] has shown that either catgut suture material or interrupted silk sutures will be more likely to permit growth of the stoma than will continuous silk, although fragmentation or stretching of the continuous silk suture can be expected to permit some enlargement. In our experience some patients with comparatively small systemic arteries have shown as much improvement as patients in the same age group and size, who had larger systemic arteries. Due to decreased resistance of blood flow in the pulmonary circulation the operation diverts more blood through the anastomosis, thereby increasing the load on the left side of the heart. The result of this, in most cases, is slight cardiac dilatation which is not progressive. It is entirely possible that ultimately these patients will fare better if the anastomosis does not become too large.

Summary

The results obtained in the surgical treatment of 20 patients with cyanosis are reported. There were three deaths which occurred during the operation or the immediate postoperative period. The causes of these deaths are discussed. No anastomosis was made in 2 cases because of the findings of increased pulmonary blood flow at operation; both of these patients recovered. In 15 surviving cases the Blalock operation was performed in 14 and the Potts operation in 1. The results have been excellent in all but 1 case, in this 1 patient, who is moderately improved, kinking of the left subclavian artery has prevented a free flow of blood. Important complications include one chylothorax requiring thoracic duct ligation, one tracheotomy for laryngeal edema and a massive hemothorax which responded to multiple thoracenteses. The method of approach and choice of the systemic vessel are discussed. It is our opinion that anastomosis of the left subclavian artery to the left pulmonary artery is preferable in most cases.

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GASTROJEJUNOCOLIC FISTULA

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Gastrojejunocolic fistula is one of the most serious complications of gastric surgery, and one of the most difficult to handle, a real catastrophe for the patient; it means blood, sweat, and fecal matter for the surgeon. It is a rather rare condition, with only a few over 300 cases having been reported in literature, although there must have been more cases that were not reported.

History

Haller is credited with having reported the first case in 1755, following a carcinoma eroding into the colon, and Czerny, in 1903, reported the first case following a gastroenterostomy. You will remember that the first posterior gastroenterostomy was done in 1885 by Von Hacker, and in 1897 Braun reported the first jejunal ulcer following a gastroenterostomy. Apparently, as the number of gastroenterostomies increased the number of gastrojejunocolic fistulae increased.

Etiology

While undoubtedly, occasionally, gastrojejunocolic fistulae follow cancer of the stomach and colon, and injuries such as stab or gunshot wounds, syphilis or tuberculosis, abdominal abscesses, etc., the vast majority are caused by ulcers on the stoma following a posterior gastroenterostomy. There seems to be no doubt but that certain individuals have an ulcer diathesis, this type being the tall, thin, nervous individual with a high gastric acidity. In this type a gastroenterostomy is a dangerous operation as they are the individuals who are more prone to develop a jejunal ulcer. According to Judd and Hoerner, 10,338 cases of gastroenterostomy were reported with 2.4 per cent with jejunal ulcers, and of these jejunal ulcers 8.7 per cent developed gastrojejunocolic fistulae. In the past 40 years there have been 18 cases of gastrojejunocolic fistulae admitted to Massachusetts General Hospital, and none since 1941. This is supposed to be due to gastric resections having replaced the gastroenterostomy as the operation of choice in that area. This condition is preponderant in males. Walters and Cleggett reported a series of 50 cases operated on at the Mayo Clinic and

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only one in a woman. The average time that elapsed between the gastroenterostomy and the development of the fistula was 48 months; however, Langmeyer reported a case in which one developed 40 years after a gastroenterostomy.

Symptoms

The symptoms are first those of a jejunal ulcer; such as, hunger pains, tenderness, etc., until the ulcer perforates the colon, then intractable diarrhea, rapid and profound loss of weight, great weakness, sometimes pain, nausea and vomiting, later foul breath, and sometime fecal vomiting with occasional hematemesis and melena. The diarrhea and loss of weight are the two most prominent symptoms, and usually produce nutritional anemia and avitaminosis, the weight loss in my 3 cases being 50 pounds each in 2 of them, and 40 pounds in the other. Diarrhea has been shown by Mathewson to be due to reflux of the colonic contents in the upper gastrointestinal tract rather than the influx of gastric contents into the large bowel.

Diagnosis

The diagnosis is not too difficult. With the history of an uncontrollable diarrhea, rapid loss of weight, and extreme weakness in a patient who has previously had a posterior gastroenterostomy one can be almost certain that he has a fistula, but it is sometimes difficult to prove. One must consider in the differential diagnosis malignancies, enterocolitis, pancreatic disease, pellagra, and sprue. The x-ray is of the greatest help, although Hinrichsen stated that the most reliable diagnostic method is that of rectal insufflation with tobacco smoke. In the presence of a fistula the smoke will appear at the patient's mouth in 30 seconds. This, I have never tried. With the x-ray, barium by mouth frequently will not show the fistula, this being probably due to a valvelike action of the mucous membrane. The barium enema, however, under the fluoroscope will show the barium going from the colon into the stomach, and a film then can be made demonstrating the fistula.

Treatment

The treatment is entirely surgical, as 100 per cent die under medical treatment. However, in the past the mortality has been high under surgical treatment. Loewy reported 63 cases with a mortality of 27 per cent; Verbrugge, 50 cases, with 25 per cent mortality; Allen, 8 cases, with 25 per cent mortality; Lahey, 8 cases, with 63 per cent mortality; Finsterer, 13 cases, with 38.4

per cent mortality; Rife, 14 cases, with 20 per cent mortality; Mayo Clinic, 50 cases, with 32 per cent mortality; Gasset, 28 cases, with 42.8 per cent mortality. It does not seem fair to quote the above mortality rates, as most of them were done before the days of the antibiotics and before the days of proper preparation and the use of adequate amounts of blood before, during, and after the operation. Today no one would think of operating on these patients until they had been brought up to the proper condition to withstand a long tedious operation, by having restored their electrolyte balance, having improved their anemia with blood, their wellbeing with proper food, and by having lessened their bactericidal content of the colon by giving sulphur drugs for several days before the operation.

There has been a number of different types of operative procedures to cure the fistula; from taking down the anastomosis, closing the wound in the colon, the stomach, and the jejunum, and restoring the original continuity of the gastro-intestinal tract to some very radical resections. Restoring the continuity of the gastro-intestinal tract in one of my cases was followed in a year by a return of the fistula; others have reported the same thing.

Pfeiffer was the first to report doing the operation in two stages; that is, by doing a preliminary colostomy. Since then a number of others have preferred this method.

This method would seem to make for a much safer operation and undoubtedly has its advantages, although in the series reported from Massachusetts General Hospital 2 cases died after the preliminary colostomy. There are certain disadvantages such as the long delay and hazard of two operations and the messy field at the second operation. It seems to me that if the patient is properly prepared he can be safely operated on in one stage. These 3 cases that I had were all done in one stage. They were prepared by restoring their fluid and electrolyte balance, by giving them sulfasuxidine for six days before the operation, and by giving blood transfusions before, during, and following the operations.

The operations were done in the following manner: under continual spinal anesthesia with just enough pentothal to make them unconscious, the abdomen was opened in the midline, the adhesions were released, the duodenum was resected and closed with catgut and cotton, the stomach was then resected between Payr's clamps proximal to the gastroenterostomy, then the remnant of the stomach, the gastroenterostomy, the fistula, and all were lifted out of the abdomen. The abdomen wall was protected with gauze pads to prevent contamination, the gastroenterostomy was then taken down,

and in the rent of the colon and jejunum was repaired with catgut and cotton. Then a Hofmeister modification of Polya's anastomosis of the jejunum to the stomach was done and the abdomen was closed with wire after the manner of Tom Jones.

I would like to report the following 3 cases:

CASE 1. Zeke W., age 25. Our records were destroyed in a hospital fire, but the history was practically as the information which follows:

In 1939 a diagnosis of peptic ulcer was first made. In 1940 he had a gastric hemorrhage, and another one in 1941. In 1942 a posterior gastroenterostomy for pyloric obstruction was done. He had another hemorrhage in 1943. In 1944 he had intractable diarrhea, loss of weight, weakness, foul belching and vomiting. A diagnosis of gastrojejunocolic fistula was made at this time. An operation for gastrojejunocolic fistula by taking down the gastroenterostomy, repairing the wounds in the colon, jejunum, and stomach, and by re-establishing the continuity of the gastrointestinal tract was done. For 17 months he gained weight and felt fine. In 1945 he again developed intractable diarrhea, lost 50 pounds in weight, had foul belching and vomiting. The x-ray showed gastrojejunocolic fistula. In 1946 a gastric resection and repair of the colon and jejunum and an appendicostomy were done. He has had much improvement in health since that time.

Case 1. Fig. 1. Following Gastrectomy

CASE 2. W. T. S., Jr., age 22, gave the history of having had an ulcer of the stomach since he was 14 years old. He stated that he had had a great deal of treatment for it but that he had had very little relief. In July, 1944, he had an almost complete obstruction to the outlet of the stomach and was operated on here. At that time he had a very large gastric ulcer on the lesser curvature of the stomach, which had eroded through the wall of the stomach,

and the liver formed one wall of the ulcer. At that time he had a posterior gastroenterostomy. He improved remarkably for about two years, gained considerable weight and was free from symptoms, but four months ago he began to have some digestive disturbances, developed an uncontrollable diar-

Case 2. Fig. 1. Showing Gastroenterostomy.

Case 2. Fig. 2. Shows Gastrojejunocolic Fistula.

Case 2. Fig. 3. After Gastrectomy

rhea, and began to lose weight rapidly, had sour belching with a foul odor at times, vomited material with a fecal odor, and had gotten very weak and anemic. He had been under the care of several doctors for the past four

months with no improvement. He had had two blood transfusions, and his blood count on admission was as follows: Hemoglobin, 70 per cent; white blood count, 3,400; red blood count 3,400,000. Physical examination was negative except that he was a thin, pale man weighing 87 pounds, with a well-healed upper paramedian operative scar. After nine days of preparation with forced feeding, vitamins, four blood transfusions, and sulfasuxidine daily, on Oct. 7, 1947, he was operated on under continuous spinal anesthesia. On opening the abdomen his stomach and jejunum were greatly dilated and there were some adhesions to the liver where the original ulcer had healed. The adhesions were all liberated, the gastrocolic and gastrohepatic ligaments were tied off and cut in segments. Payr's clamps were placed on the duodenum and cut between, the duodenum was then closed with two rows of catgut and one row of interrupted cotton sutures. Then the stomach was cut between a pair of clamps placed on the stomach proximal to the gastroenterostomy, then the remnant of the stomach and the gastroenterostomy with the colon attached were lifted out of the abdomen and the abdomen packed off with warm saline pads. The gastroenterostomy was then taken down and on separating the fistula from the colon an ulcer on the jejunum which had eroded into the colon was found. After separation, the rent in the colon was closed with catgut and interrupted cotton sutures, the rent in the jejunum was likewise closed, then a posterior Hofmeister modification of Polya's anastomosis to the stomach was done; the abdomen was then closed with silver wire after the manner of Tom Jones. An appendicostomy was done through a stab wound, 2 pints of blood being given during the operation. Time: 3 hours 15 minutes. For several days blood transfusions were given. After a stormy convalescence he left the hospital on the sixteenth day. Three months later his weight was 150 pounds, and he has been well since that time.

Case 3. Fig. 1. Showing Gastroenterostomy

Case 3. Mr. G. E. B., age 53, gave a history of indigestions for 20 years, hunger pain and relief on taking alkali. From 1945 to 1947 his symptoms

were much worse and in April, 1947, his doctor operated on him, telling him that his stomach was stopped up. He did a posterior gastroenterostomy on him and he was much better for a year. He gained weight and the pain was relieved until June, 1948, at which time he began to have severe diarrhea,

Case 3. Fig. 2. Shows Gastrojejunocolic Fistula

Case 3. Fig. 3. After Gastrectomy

lost 40 pounds in weight, had foul belching, frequent vomiting, and the vomiting smelled like bowel movements. Nothing would relieve his diarrhea, and a barium enema showed barium entering the stomach. He entered the hospital Oct. 11, 1949. After five days of preparation with sulfasuxidine, vitamins, blood, etc., he was operated on on October 15, with the same technic as that of the previous case, except that a cecostomy was done. The abdomen was closed with wire after the manner of Tom Jones. This operation took 2 hours and 20 minutes. He left the hospital in 14 days and has been doing well since then.

SUMMARY

1. Something of the history, etiology, symptoms, diagnosis, and treatment of gastrojejunocolic fistula has been discussed.

2. Three cases of gastrojejunocolic fistulae following posterior gastroenterostomy have been reported.

3. The importance of proper preparation of the patient for operation is stressed.

4. A method of resecting the stomach first and lifting the fistulous mass out of the abdomen before separating the anastomosis to lessen contamination is reported.

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PROGRESS IN TREATMENT OF THYROTOXICOSIS IN THE LAST FORTY-FIVE YEARS

Thirty-five years ago, when the surgical service at Grady Hospital changed and I went on duty, I found a patient who had been operated on the previous day for toxic goiter by another surgeon. She was in a severe thyroid crisis, and it required four nurses to hold her in bed. She was delirious, had a high fever and a pulse so rapid that it could not be counted. Her eyes were staring into space, her tongue was very dry and coated and she was picking at imaginary objects in the air. She died in a few hours.

The injection of boiling water into toxic goiters was practiced early in this century to reduce toxicity and to prepare patients for surgery later. This procedure resulted in extensive necrosis, scar tissue formation, and at times areas of the skin sloughed. This treatment was soon abandoned. Polar ligations were then used to prepare these patients with toxic goiter for surgery. This procedure proved very valuable and markedly reduced the then high operative mortality rate, which was 5 per cent to 17 per cent in the various hospitals and clinics over the country.

These thyroid crises were very frequently seen prior to 1924, when Dr. Henry Plummer of the Mayo Clinic first suggested the use of iodine to reduce thyrotoxicosis in the preparation of patients for surgery. The use of iodine could be said to have revolutionized thyroid surgery. After its use became general, postoperative crises were not so common. They occurred occasionally, but the mortality rate was very markedly reduced, in some clinics to less than one per cent. When patients were kept on iodine too long they became iodine-fast and it lost its effect. The maximum benefits were usually obtained in 14 to 21 days. We have had cases referred to us with a basal metabolism rate of plus 100 who were iodine-fast, having been on iodine for three months or longer. These patients required either polar-ligation or x-ray therapy before thyroidectomy.

We also went through an era of x-ray therapy for thyrotoxicosis which would reduce some patients to almost a state of euthyroidism, but usually when x-ray was discontinued the thyrotoxicosis returned with renewed vigor. I remember seeing a patient in consultation—an exceptionally beautiful lady, who had a toxic goiter and, wishing to avoid scarring her beautiful neck with an operation, she had persuaded a doctor to give her x-ray therapy. He was overly enthusiastic about the treatment and gave her an excessive dose of x-ray, and as a result her skin was horribly burned and scarred. She later developed cancer of the larynx with stricture, which also was thought to be the result of x-ray treatment. She died a horrible death from cancer. Some patients treated with x-ray therapy became myxedematous.

Then came the anti-thyroid drugs. In 1942, Dr. E. B. Astwood introduced the "thiouracils" which promised great things for victims of thyrotoxicosis. Some internists stated that surgery for the removal of the thyrotoxic goiter would soon be a thing of the past. The use of thiouracil rapidly reduced the toxicity and the basal metabolism rate; many patients became euthyroid but the goiters increased in size. Many patients were kept on this drug for two or three years but the goiter was not cured, and when thiouracil was omitted approximately 55 per cent of the patients had symptoms to recur. When a patient who had been taking thiouracil came to surgery, it was found that the blood supply to the gland had markedly increased and the gland was very friable—both of which made surgery much more difficult. Thiouracil may also cause a reduction in the white blood cells, in many instances resulting in agranulocytosis which is occasionally followed by death. This drug has proved too toxic and too dangerous and requires a too close laboratory check on blood cells. Its use has been discontinued by the majority of doctors and it should be outlawed.

Thiouracil has been replaced by propylthiouracil which is much less toxic and a much safer drug, although it does not reduce the patient's toxicity quite so rapidly. The blood count does not have to be watched so closely. It is estimated that propylthiouracil in sufficient doses will reduce the toxicity of acute toxic goiters approximately 1 per cent of the basal metabolism rate each day, while the nodular toxic goiter is reduced approximately one-half that rate. One can estimate in this way just about how long it will require to prepare the patient for surgery. There are several other thiouracil preparations, viz., methylthiouracil and ethylthiouracil, but we have found propylthiouracil the most satisfactory in preparing our patients for surgery and with its use we have seen no thyroid crises. To overcome the increased vascularity and friability of the gland we discontinue propylthiouracil two weeks prior to operation and give iodine in the form of Lugol's solution—10 drops three times a day for two weeks. This hardens the gland and makes it less friable, thereby making surgery easier for the surgeon and safer for the patient.

The next advance in the treatment of thyrotoxicosis has been the use of radioactive iodine or I_{131}. The radioactive isotope is a by-product of the development of the atomic bomb in World War II, and came into use immediately thereafter. A few years ago considerable enthusiasm was centered on the accumulation of I_{131} in the acini of the toxic goiter which, in truth, meant local radiation of these cells and a reduction in their activity. No doubt you will recall having seen notices from the press announcing "cure of toxic goiter with a single dose of radioactive iodine" which, of course, appealed to laymen who were concerned or interested. Even now some of the so-called thyroid specialists use the "iodine cocktail" extensively, which is simply a dose of radioactive iodine in a glass of water and for which they may charge $100.00.

In 1894, Roentgen in Germany discovered x-ray and soon thereafter, before its dangers were realized, a great many doctors who administered the treatment, as well as their patients, received severe x-ray burns, some of which later became malignant. In 1899 the Curies of France discovered radium, the first of the radioactive minerals. It is a well-known fact that burns from both x-ray and radium will, and have in many instances, cause cancer—and so it may be with radioactive iodine. At the present time it is too early to say just what damage may result in later years. I think of it as a two-edged sword, evidently capable of doing a great deal of good if used correctly, but also capable of doing a great deal of harm if used indiscriminately. It has been in use only a few years and it may be 20 years before we can properly evaluate its benefits

and its dangers. We know now that I_{131} is concentrated in the thyroid gland and may partially or totally destroy the gland and in some instances result in myxedema. It is a known fact that the use of this drug does reduce thyroid toxicity, and patients to whom it is given probably should take several repeated small doses rather than one large dose. We are finding that some of these patients so treated ultimately come to surgery. At the present time it is the opinion of many of the best thyroidologists that I_{131} is too dangerous a drug to be used indiscriminately, but should be reserved for those aged patients with bad hearts or who for other reasons are poor operative risks, for those cases of recurrent thyrotoxicosis where further surgery would be undesirable, and especially for those patients with thyroid cancer with distant metastases.

We now have still another new drug, Methimazole (Tapazole) which is made by Eli Lilly and is not on the market yet, as it is still in the experimental stage. We have a supply of this drug which we are using on a limited number of patients at this time to prepare them for surgery. They claim that it is twenty-five times stronger than propylthiouracil, that it is nontoxic, and that it will prepare patients for surgery earlier and is safer for the patient. We hope to be able to give a report on this drug later.

For the past 50 years, after proper preoperative preparation, subtotal or total thyroidectomy has proved to be the treatment of choice for thyrotoxicosis. Now that we have the antithyroid drugs which are relatively nontoxic and since their preoperative use brings the patient to the euthyroid state the postoperative thyroid crisis is eliminated and the operative mortality is practically eliminated. We believe that in diffuse toxic goiters more total thyroidectomies, rather than subtotal, should be done, inasmuch as following a subtotal thyroidectomy the toxic symptoms are prone to continue or to recur, and often require subsequent surgery. We now make it a rule to isolate the recurrent nerve and since we have followed this procedure we have had no nerve injuries.

We have seen wonderful progress in the treatment of thyrotoxicosis in the last 25 years with the advent of iodine and the antithyroid drugs (including I_{131}), yet all of these have not replaced surgery but have made the patient safer for surgery. However, we feel that the advent of these drugs only emphasizes more and more the need for closer cooperation on the part of the internists and the surgeon in the diagnosis and preoperative treatment as well as postoperative care of thyrotoxic patients.

T. C. DAVISON, M.D., F.A.C.S., F.I.C.S.(Hon.)
President of the American Goiter Association

BOOK REVIEWS

The Editors of THE AMERICAN SURGEON *will at all times welcome new books in the field of surgery and will acknowledge their receipt in these pages. The Editors do not, however, agree to review all books that have been submitted without solicitation.*

NEWER CONCEPTS OF INFLAMMATION. By Valy Menkin, M.A., M.D., Associate Professor of Experimental Pathology, Head of Experimental Pathology Department, Agnes Barr Chase Foundation for Cancer Research, Denver University School of Medicine. Springfield, Ill.: Charles C Thomas, Publisher. 152 pages, 81 illustrations. $3.50.

Although this booklet is intended for dentists and this lecture was first given before the Mid-west Seminar of Dental Medicine, the volume is of real and lasting importance to the medical profession also. The monograph is quite interestingly written; thus it is easily readable. It represents supplemental data to an earlier publication, entitled "Dynamics of Inflammation," which was published in 1940. In these last ten years many studies have been focused in an attempt to understand the basic mechanisms involved in the development of the elementary immunological response to inflammation. This has been found referable to the liberation by the injured cells of various biochemical units and thus the author focuses one's attention on the biochemistry of injured cells primarily.

The first chapter discusses the problem of increased capillary permeability and the role of the hydrogen iron concentration in the development of the inflammatory reaction. The second chapter deals with the role of inflammation in immunity, while the third considers phagocytosis and the chemical factors in inflammation. The fourth discusses diabetes in inflammation as well as the causes of fever and leukopenia in the inflammatory condition, as well as repair.

Nowhere in all of our reading have we found a book or a collection of material which helps to clarify the picture of inflammation as does this small volume. It is very well written and nicely illustrated. The writing, while technical, is quite easy to follow and logical conclusions drawn by the author can be easily accepted.

This is a very worthwhile volume for all individuals interested in medicine, whether they be dentists or physicians.

A. H. LETTON, M. D.

PLASMA CLOT SUTURE OF PERIPHERAL NERVES AND NERVE ROOTS, RATIONALE AND TECHNIQUE. By I. M. RARLOV, M.D. Charles C Thomas, Publisher, 116 pages, 47 illustrations. $5.50.

This is a scholarly and graphic presentation of a newly developed method for the repair of severed or traumatized peripheral nerves. In skilled hands it may prove to be superior to the usual repair by suture with fine silk or tantalum wire. In addition to the careful and detailed outline of the plasma clot technic of suture there is an excellent discussion of all the phases and problems of peripheral nerve suture, including a clinical evaluation of the use of various types of grafts.

Cauda equina lesions have always been more or less a hopeless problem, particularly when there is any degree of loss of nerve substance and the use of this method may prove to be a solution to the repair of these defects.

The author does not claim this to be the last word in treatment of these lesions but he does feel that, in the hands of a patient operator, it may prove to be the best available technic.

ROBERT F. MABON, M.D.

ABSTRACTS FROM CURRENT LITERATURE

LUMBAR HERNIA. Max Thorek. *The Journal of the International College of Surgeons 14*:367-393 (Oct.) 1950.

Though the possibility of hernia in the lumbar region was mentioned by anatomists about 1700 and though at least 2 cases (one not diagnosed as such) were described prior to Petit's classical description in 1733, the lower lumbar triangle and hernia through this space both bear Petit's name. One hundred and thirty-three years later, Grynfeltt described a hernia of the superior lumbar triangle and in 1870 his findings were confirmed by Lesshaft. For many years the occurrence of hernia through the space of Grynfeltt-Lesshaft was doubted but subsequent reports by Rigyon, Bruan, Wolff and others confirmed the occurrence of this additional type of lumbar hernia.

Lumbar hernia, which may occur at any point in the lumbar region, may be either congenital or acquired. Acquired lumbar hernia may be either spontaneous or traumatic. When spontaneous, it is probably due to a delayed effect of some congenital weakness; if traumatic to injury or strain.

Thorek classifies lumbar hernia as follows: (1) *Extraperitoneal* herniations of the viscera through either lumbar space, in which the escaped contents have no paritoneal covering; (2) *Paraperitoneal* herniation of viscera or parts thereof, accompanied by an adherent portion of the peritoneum following the descent of the hernia; and (3) *Complete intraperitoneal* (*sliding*) lumbar hernia with the peritoneum accompanying its descent and covering it entirely, forming a true peritoneal sac.

Lumbar hernia occurs more frequently in the male and shows a predilection for the left side of the body. It may be unilateral or bilateral, the unilateral being more frequent in the acquired form. The highest incidence or occurrence is among persons of middle age.

No great difficulty is encountered in diagnosis in most instances since a palpable tumor is usually present. If bowel is contained in the hernia, reduction is likely to be accompanied by a gurgling sound. Subjective symptoms may be few or absent. Colicky pain, vomiting, fatigue, and a "dragging down" feeling may occur. Tenderness on pressure and pain in the back are sometimes noted.

The treatment of choice is radical operation. The operative technic depends upon the type of hernia encountered. Diagrammatic illustrations of two methods of repair are included. The prognosis is favorable.

A tabulation of 125 cases collected from the literature is presented. This number includes 2 cases of Thorek's reported in detail in this communication.

R. H. S.

A CASE OF HERNIA OF THE TRIANGLE OF PETIT. Zygmunt Ambros and Mieczyslaw Koszla. *Polski Przglad Chirurgiczny 22*:668-673 (Sept.) 1950.

Following a brief review of the historical aspects of the subject and a discussion of the clinical picture, the authors describe the case of a 13 year old boy who had developed a lumbar hernia one year prior to admission. The hernia was treated by radical surgery. The sac presented through the triangle of petit. The hernia was of the completely intraperitoneal type, the sac con-

taining omentum. The hernial hiatus was closed by means of duplication of the aponeuroses. Follow-up one year after operation revealed no evidence of recurrence.

(Editor's note: In the same issue of Polski Przglad Chirurgiczny, Koszla reports an analysis of his personal cases of external hernia treated in the Warsaw Hospital for Children. Of 369 cases, 9 were of lumbar hernia. Details of these are not included. Apparently none of these nor the case reported in the article abstracted above are included in Thorek's compilation. The addition of these would bring the total number of reported cases to 135.)

R. H. S.

PREVENTION OF DEATH FROM EXPERIMENTAL LIGATION OF THE LIVER (HEPATIC PROPER) BRANCHES OF THE HEPATIC ARTERY. Carlos Tanturi, L. L. Swigart, and Juan F. Canepa. *Surgery, Gynecology and Obstetrics 91*:680-704 (Dec.) 1950.

In undertaking this study to elucidate the cause and mechanism of death following ligation of the hepatic proper arteries in dogs, the authors have been particularly interested in the role of the toxic enzyme, lecithinase. Ligation of the liver branches of the hepatic artery in 32 dogs resulted in death in 22, a mortality rate of 68.7 per cent. In the 10 dogs (31.3 per cent) who survived the operation, no collateral circulation could be found to account for survival. Eight other dogs were similarly robbed of their arterial supply to the liver and were given 300,000 units of penicillin daily for four days postoperatively. All of these animals survived.

Treated and nontreated dogs were sacrificed at various intervals following operation with the time interval after operation great enough to warrant assumption that the animals would survive indefinitely. When the hepatic proper branches were ligated but not severed, recanalization occurred in about two months but when they were severed, postoperative anatomical studies revealed small branches arising from the posterior superior pancreaticoduodenal artery and coursing through the hepatoduodenal ligament. These vessels do not carry enough blood to account for the survival of the dogs. Animals survived in which no such branches could be demonstrated. Studies performed with the injection of red lead material into the hepatic branches failed to demonstrate any connection with the inferior phrenic arteries and no subcapsular anastomosis beneath Glisson's capsule could be demonstrated.

Cholecystectomy does not influence the final outcome of the animals.

Rapidly occurring alterations take place in the liver and other tissues in the nontreated animals who died. These are reflected by the severe hypoprothrombinemia, hyperphosphatasemia, hypoglycemia, hemolysis and hemoconcentration as well as histological changes in the liver and adrenal cortex.

The fact that penicillin prevented death suggests that a factor which is not specifically related to the arterial supply of the liver cells is involved in the cause of death. Dogs were sacrificed in the morbid state and examination of the liver revealed the presence of bacteria having the characteristics of anaerobic rods. These were seen in the vessels and the intercellular spaces. In the penicillin-treated dogs, no histological changes could be observed except slight cloudy swelling.

Lecithinase was present in the abdominal fluid of the dogs that died. This enzyme has been identified with the alpha-toxin of Clostridium perfringens, type A, organisms. Intravenous injection of this toxin in the dog reproduced

the pathological picture and blood changes seen in the dogs who died as a result of ligation of the liver branches of the hepatic artery and was followed by death. A liver-adrenal cortex homeostasis seems important to account for a bactericidal function of the liver.

Active immunization against Clostridium welchii alpha-toxin previous to ligation increased the average survival time from 37 to 98 hours.

The authors conclude that the dog's liver can survive the loss of its arterial supply. Penicillin prevents death by inhibiting the proliferation of anaerobic bacteria thereby preventing the production of a lethal enzyme in the liver. In explaining the spontaneous recovery of nontreated dogs, they feel that variations in the bactericidal function of the liver and seasonal resistance must be considered.

R. H. S.

THE OUTLOOK FOR PATIENTS WITH LEIOMYOMAS OF THE STOMACH. L. H. Appleby. *The Journal of the International College of Surgeons 14*:512-516 (Nov.) 1950.

Though leiomyoma of the stomach is uncommonly encountered by any one surgeon, they constitute about one-half of all the benign tumors of the stomach (in which about 1 per cent of all tumors are benign) and, cumulatively, a large number of cases are recorded. The author reports herewith 6 additional cases. These have occurred among 968 patients whom he has treated by gastric resection in the past 20 years. The increasing frequency with which this disease is reported probably results from more frequent recognition rather than any increase in the frequency of occurrence.

Of Appleby's 6 cases, 3 had undergone malignant degeneration. The three malignant tumors occurred in men while the three benign ones were encountered in women. The author was unable to detect any difference in the two on gross examination. Of the three malignant tumors, two were treated by simple excision or peeling out. Despite this all 6 patients are alive and well and the three malignant tumors have not recurred over a period of 12 years, seven years and nine months respectively.

Superimposed ulceration occurred in all the author's cases. He reviews the diagnostic findings on x-ray and gastroscopic examination. Hemorrhage is frequent and may be expected if such lesions are known to exist.

The author concludes that the grade of malignancy is probably very low but that wide resection is indicated if achlorhydria, atrophic mucosa or other stigmata are present and in all doubtful cases. Local resection is indicated when there is associated acid and the adjacent mucosa is otherwise normal. Detailed case reports are included.

(Editor's note: Frequent reports of prolonged survival after "inadequate" excision of this lesion should prompt reinvestigation of the criteria for the histological diagnosis of malignancy in these tumors.)

R. H. S.

ERRATUM—The name of

DR. CHARLES LEON JOHNSON, JR., 421 Cherokee Avenue, Bartletsville, Okla., was inadvertently left off the roster of The Southwestern Surgical Congress, which appeared in the January issue of *The American Surgeon*.